Query Management Facility

IBM

QMF High Performance Option User's Guide for OS/390

Version 6

> **Note!**
>
> Before using this information and the product it supports, be sure to read the general information under "Appendix J. Notices" on page 333.

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The QMF Library

You can order manuals either through an IBM representative or by calling 1-800-879-2755 in the United States or any of its territories.

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Figure 1. The QMF Library

Chapter 1. Rocket Compiler

Welcome to QMF HPO/Compiler, the family of system utilities for generating, preparing, and running report programs for IBM's Query Management Facility (QMF).

Compiler comprises these integrated components:
- Program Generator
- End User Facility

Program Generator

This facility is used by programmers to convert QMF reports (queries, forms, and procedures) into compiled programs. In addition, this facility can automatically register report programs with the End User Facility.

End User Facility

As programs are generated and prepared for execution, they are automatically registered with the End User Facility. Once programs are registered, this facility is used by end users to run the compiled report programs. The non-technical user interface makes it easy to list, locate, and process reports.

After selecting a report, the end user is prompted to supply any runtime variable values. If the report is to run in batch mode, JCL is automatically generated and optionally submitted. Otherwise, the interactive report is run online in the appropriate environment, TSO or CICS[1].

Starting HPO/Compiler

You can display the Compiler Selection Menu by issuing the following TSO command:

```
CALL 'QMFHPO.SRAALOAD(RAAMAIN)' 'M1'
```

Selection menu

This is the Compiler Selection Menu:

---

1. Trademark of IBM Corporation

```
QMF HPO/Compiler -- Selection Menu ------------------------------------- 6.1.0
ENTER SELECTION ===>
                                    DB2 ID   ===> DB2P
                                    Location ===> DB2PLOCATION
                                    User ID:
                                    Date:
                                    Time:
-------------------------------------------------------------------------------
1  Program Generator
2  End User Facility
Q  QMF
X  Exit
-------------------------------------------------------------------------------
5645-DB2 Copyright (C) 1998 IBM Corp.  All Rights Reserved.
Copyright (C) 1998 Rocket Software, Inc. All Rights Reserved.
IBM is a registered trademark of International Business Machines Corporation.
Rocket is a registered trademark of Rocket Software, Inc.

-------------------------------------------------------------------------------
```

You can invoke each of the menu options using the listed one-character
selection codes.

Chapter 2. Program Generator

Overview

This chapter describes the use of Program Generator. With Program Generator, you can:

- Generate programs
- Prepare programs
- Run programs
- Maintain the End User Facility tables

Generate programs

Program Generator generates QMF report programs. At the simplest level, a QMF report is the result of issuing the QMF commands RUN QUERY and PRINT REPORT. A report program generated by this facility produces the same result, although there might be significant variations on a program's function (for example, it might also perform a SAVE DATA command). In this manual, a query (or a query and form) is often referred to simply as a report. QMF procedures, which consist of a series of QMF commands, contain one or more reports. Program Generator can generate one program for each report in a procedure, and can also generate a single proc program that runs each of the report programs in the procedure.

The Generate Programs option guides you through the process of specifying and locating the inputs (queries, forms, and procedures), specifying options for the programs to be generated, and generating the programs. This option provides hooks into other Program Generator options (Prepare Programs and Run Programs) to automatically perform additional functions on a program once it is generated. It also provides a mechanism to register generated programs for use with the End User Facility.

Prepare programs

Program Generator provides a convenient panel-driven interface to easily prepare DB2 programs, either online or in batch. **Preparing** a program involves running a precompile, bind, CICS command translation (for CICS programs), compile, and link. The Compile Programs option is tailored to preparing the type of programs generated by the Generate Programs option, but can be used to prepare DB2 programs from any other sources that fit the same model.

3

Run programs

The Run Programs option gives you the ability to run DB2 programs online and to tailor and submit JCL to run batch DB2 programs. The user simply specifies a program to run and its characteristics, and Program Generator automatically performs all of the work to properly run it.

Maintaining the End User Facility tables

Program Generator provides an easy-to-use, panel-driven interface that allows you to maintain the information about the reports registered to the End User Facility. This option provides list, browse, create, drop, and edit functions for End User Facility reports (which are registered in DB2 tables).

Starting Program Generator

You can start this facility from a normal TSO/ISPF session or directly from a QMF session under TSO/ISPF. Starting from within a QMF session allows you to work with any current QUERY, FORM, or PROC object.

Starting from TSO/ISPF

You can start Program Generator by selecting option 1 from the Compiler Selection Menu. You can also invoke this facility by issuing the following TSO command:

```
CALL 'QMFHPO.SRAALOAD(RAAMAIN)' 'CO'
```

Starting from QMF

You can start Program Generator from QMF by running a QMF procedure that consists of this QMF command:

```
TSO CALL 'QMFHPO.SRAALOAD(RAAMAIN)' 'CO'
```

Additionally, you might want to build a command synonym that runs this procedure so that users can easily access the procedure without having to fully qualify its name (see "Running programs" on page 49). A QMF command synonym named RCO is created during the standard installation process so that you can easily invoke this facility from QMF.

Selection menu

This is the Program Generator Menu :

```
QMF HPO/Compiler -- Program Generator Selection Menu ------------------- 6.1.0
ENTER SELECTION ===>

                                        DB2 ID   ===> DB2P
                                        Location ===> DB2PLOCATION
                                        User ID:
                                        Date:
                                        Time:

 ------------------------------------------------------------------------------

 1  Generate Programs (Full Dialog)
 2  Generate Programs (Short Dialog)
 3  Compile Programs
 4  Run Programs
 5  Maintain End User Facility Reports
 D  Set Default Parameters
 X  Exit
```

Generating programs

The generation process proceeds in two phases. The first phase consists of specifying the inputs (queries, forms, and procedures), and locating them. Locating the inputs consists of either exporting them from QMF to specified data sets and members (or temporary data sets), or verifying that they already exist outside of QMF. The goal of this phase is to produce a list of all reports specified in the input, along with the pertinent information about each (for example, query name, form name, query data set and member, and so on). This list is referred to as the Report List.

The second phase consists of using the Report List to selectively operate on, and generate programs for, each report. Operations include reviewing the query (browsing or editing it), providing values for substitution variables in the query and form, and setting generation options for the program.

Generating programs with the full dialog panel

Program generation is initiated from one of two panels: the Generate Programs (Full Dialog) panel or the Generate Programs (Short Dialog) panel. Most of the discussion in this chapter on generating programs refers to the

Full Dialog option. Using the Short Dialog option to generate programs is
discussed later in this chapter, as is generating programs using batch JCL.

Selecting option 1 from the Program Generator Menu brings you to the
Generate Programs (Full Dialog) panel . This panel can also be reached
directly by issuing the following TSO command:

```
CALL 'QMFHPO.SRAALOAD(RAAMAIN)' 'CO 1'
```

```
DB2P / DB2PLOCATION -- Generate Programs (Full Dialog) ------------------ 6.1.0
COMMAND ===>
Use % and _ as wildcard characters to produce a list of objects
Press ENTER to proceed to next panel.
Type CAN or CANCEL or press PF3 to end.

Generate programs from one of the following:

1. Query Name.... ===>

2. Query Name.... ===>
   Form Name..... ===>

3. Procedure Name ===>
```

If you press Enter, all input fields will be validated. If any errors are detected
during input validation, the panel will be redisplayed with an error message.
Otherwise, the program generation process will begin.

If you press PF3, all input fields will be ignored and you will return to the
Program Generator Menu.

Before you can generate a program, you must identify the input source: a
query, a query and form combination, or a linear procedure. If you choose a
query or a query and form, a Report List with one report will be produced. (If
you choose a query with no form, the same default form settings as QMF are
assumed, and a form name of *DEFAULT is used.) If you choose a procedure,
the procedure will be parsed, and a Report List will be produced consisting of
all reports specified in the procedure.

The fields on the panel are:

Query Name

> Enter the name of a query from which to generate a program. If the
> name is unqualified, then the current SQLID will be used as the query
> owner. You can also enter the name QUERY to specify the current QMF

query object. You can use % and _ as wildcard characters in the name to produce a list of queries from which to select.

Form Name

Enter the name of a form from which to generate a program (along with a query). If the name is unqualified, then the current SQLID will be used as the form owner. You can also enter the name FORM to specify the current QMF form object. You can use % and _ as wildcard characters in the name to produce a list of forms from which to select.

Procedure Name

Enter the name of a linear procedure from which to generate programs. If the name is unqualified, then the current SQLID will be used as the procedure owner. You can also enter the name PROC to specify the current QMF PROC object. You can use % and _ as wildcard characters in the name to produce a list of procedures from which to select.

Confirming query and form locations

After the inputs are specified, a list of the reports they specify is built that contains the name of the query and optional form for each. The goal of the next part of the input specification phase is to make sure that each object referenced exists (in exported format) in a data set and member. At this time, objects that have not already been exported (that is, they exist only in QMF) are automatically exported. Also, the existence in the specified data sets of all objects that have already been exported is verified at this time.

This part of the input specification phase is controlled from the Confirm Query/Form Locations panel. This panel lists the name and location of the query and form for each report for which you are generating a program. This panel is only displayed if the **Confirm Query/Form Locations?** flag on the Set Default Parameters panel is set to Y. If it is set to N, the display of this panel is suppressed, and default values are used for all fields.

Confirm Query/Form Locations panel

When this panel is first displayed, the **Exp**, DSN, and Mem fields are filled in with values from the Set Default Parameters panel. However, if the input to the generation process was a procedure that contained IMPORT commands for any of the listed objects, the data sets and members referenced in those commands are used for the corresponding objects on this panel. You can change any of the fields for any of the objects listed by typing over the value.

```
DB2P / DB2PLOCATION -- Confirm Query/Form Locations -------------------- 6.1.0
COMMAND ===>                                               SCROLL ===> PAGE

Set Exp / DSN / Mem fields for each report's query and form.
Press ENTER to proceed to the Report List panel.
Type CAN or CANCEL or press PF3 to cancel generation process at this time,

--------------------------------------------------------------------------------
Report
    Query :
        Exp ===>
        DSN ===>                                              Mem ===>
     Form  :
        Exp ===>
        DSN ===>                                              Mem ===>

 --------------------------------------------------------------------------------
****************************** BOTTOM OF DATA ******************************
```

If you press Enter, all input fields will be validated. If any errors are detected
during input validation, the panel will be redisplayed with an error message.
Otherwise, the program generation process will proceed with these location
settings.

If you press PF3, the program generation process will stop and you will
return to the Generate Programs panel.

If you press PF7 or PF8, the panel will scroll backward or forward.

The following fields are listed for each input query and form. If there is no
form specified for a particular report, then the input fields for that form are
initially blank and are ignored.

Exp   Enter Y if this object currently resides in QMF and should be exported
to the specified data set. Enter N if this object has already been
exported to the specified data set.

DSN   Enter the name of the data set into which this object should be
exported (if the **Exp** flag is set to Y) or which contains this object (if
the **Exp** flag is set to N). The named data set must exist. If the name is
enclosed in single quotes, it is taken to be a fully qualified TSO data
set name. Otherwise, your current TSO profile prefix is used to qualify
the name. If it is a PDS, do not specify a member name here; use the
Mem field. If the **Exp** flag is set to Y, the name *TEMP may be entered,
specifying that a temporary data set should be created for the export.

Mem   If the specified **DSN** is a PDS, you must enter the member into which

this object should be exported or which already contains this object. If the specified `DSN` is not a PDS or is *TEMP, this field must be left blank.

Confirming exports

If the **Confirm Exports?** flag on the Set Default Parameters panel is set to Y, the Export Confirmation panel will be displayed before any objects are exported.

Under QMF Version 3 and later

Two commands are issued by Program Generator when exporting a query. First, a CONVERT command is issued to ensure that the query is an SQL query (as opposed to a prompted or QBE query), and then an EXPORT command is issued. The CONVERT command converts the specified query and replaces the current query object with its SQL version. This current query is then exported.

Note: The CONVERT command resets the contents of the current query object.

On the Export Confirmation panel, the command displayed is the **effective** export command, not the commands which are actually issued. For example, if a query named QUERY1 is exported, the command as displayed on this panel is:

```
EXPORT QUERY QUERY1 TO ...
```

while the actual commands issued are:

```
CONVERT QUERY QUERY1 ...
EXPORT QUERY TO ...
```

Under QMF Version 2

Under QMF Version 2, no such conversion takes place, and prompted and QBE queries are not supported. (If you try to export a prompted or QBE query under QMF Version 2, the export will fail and QMF will produce an error message indicating an invalid record format.)

Export Confirmation panel

This is the Export Confirmation panel.

```
DB2P ⁄ DB2PLOCATION -- Export Confirmation ----------------------------- 6.1.0
COMMAND ===>

Press ENTER to confirm this export command.
Type CAN or CANCEL or press PF3 to bypass this export command.



About to issue this EXPORT command to QMF:
----------------------------------------------------------------------



----------------------------------------------------------------------
```

If you press Enter, the export command will be processed by QMF.

If you press PF3, the export command will be bypassed and the object that was being exported will be assumed **not** to exist in the specified data set and member.

If you type NOCONF and press Enter, the export command will proceed, and the value of the **Confirm Exports?** flag on the Set Default Parameters panel will be set to N. All subsequent exports will proceed without confirmation.

The Report List

If you specified a linear procedure as input to the generation process , then a list of queries and forms referenced in that procedure is built. This list is called the Report List. Subsequent processing on this list is performed from the Report List panel.

If you specified a query or a query and form combination as input, then the Single Report List is produced. Subsequent processing on this single entry is performed from the Single Report List panel.

Operating from the Report List panel

If you specify a linear procedure as input to the generation process, then when the input specification phase is complete, Program Generator will have

produced a list of the reports specified and verified that each object referenced in each report exists in exported format in the data set specified for that object.

Report List panel

The Report List panel displays one row for each report in the Report List. Each row lists the query name, the form name, and a set of input fields which control the generation process for that report. The rest of the generation process is controlled from this panel, based on the settings of these input fields.

```
DB2P / DB2PLOCATION -- Report List -------------------------------------- 6.1.0
COMMAND ===>                                                    SCROLL ===> PAGE
Set the action flags in each row.
Press ENTER to process the action flags.
Type CAN or CANCEL or press PF3 to end.

Browse Procedure? (Y/N)..... ===>
Generate Proc Program? (Y/N) ===>

Review Edit Generate

Num Query                      Form                      Query  Vars Program
--- -------------------------- ------------------------- ------ ---- --------

****************************** BOTTOM OF DATA ********************************
```

If you press Enter (without entering a command), the action flags will be processed. These flags direct which panels will be displayed next. The Report List panel will not be displayed again until all of the flags have been processed, or until an error is encountered in processing the flags.

If you press PF3, the action flags will be ignored and you will return to the Generate Programs panel.

If you press PF7 or PF8, the panel will scroll backward or forward.

If you type NOCONF and press Enter, the value of the **Confirm Exports?** flag on the Set Default Parameters panel will be set to N.

If you type CONF and press Enter, the value of the **Confirm Exports?** flag on the Set Default Parameters panel will be set to Y.

If you type STOPQMF and press Enter, and if a QMF session has been started to issue export commands, the session will be terminated. This command has no effect when Program Generator was started from within a QMF session.

If you type EDIT <num> and press Enter, where <num> is a valid report row number, you will edit the previously generated program for that report row. If you type EDIT PROC and press Enter, you will edit the previously generated proc program.

If you type REGISTER <num> and press Enter, where <num> is a valid report row number, you will proceed to the Register Programs panel with initial values set for registering the program in that report row. If you type REGISTER PROC and press Enter, you will proceed to the Register Programs panel with initial values set for registering the proc program.

If you type COMPILE <num> and press Enter, where <num> is a valid report row number, you will proceed to the Compile Programs panel with initial values set for preparing the program in that report row. If you type COMPILE PROC and press Enter, you will proceed to the Compile Programs panel with initial values set for preparing the proc program. See "Preparing programs" on page 41 for information on the Compile Programs option.

If you type RUN <num> and press Enter, where <num> is a valid report row number, you will proceed to the Run Programs panel with initial values set for running the program in that report row. If you type RUN PROC and press Enter, you will proceed to the Run Programs panel with initial values set for running the proc program. See "Running programs" on page 49 for information on the Run Programs option.

The fields on the panel are:

Browse Procedure?
Enter Y to browse the input procedure. If you enter N, then you will not browse the input procedure.

Generate Proc Program?
Enter Y to proceed to the Proc Program Generation Options panel to generate a program for the procedure. If you enter N, no action will be taken. You must generate programs for each report in the procedure before you can generate the proc program.

Review Query
Enter B to browse the input query, E to edit the input query, or N to do neither.

Edit Vars
Enter Y to proceed to the Edit Variables panel. If you enter N, no action will be taken.

Generate Program

Enter Y to proceed to the Generation Options panel, and to generate a program for this report. If you enter N, no action will be taken.

Operating from the Single Report List panel

If you specify a query or a query and form combination as input to the generation process, then when the input specification phase is complete, Program Generator will have verified that the query and optional form referenced exist in exported format in the data set specified for each.

Single Report List panel

The Single Report List panel displays the same information for one report as the Report List panel displays in each row for each report in the Report List. The query name, form name, and three input flags that control the generation process for the report are listed. The rest of the generation process is controlled from this panel, based on the settings of these input flags.

```
DB2P ⁄ DB2PLOCATION -- Single Report List ------------------------------ 6.1.0
COMMAND ===>

Set the action flags.
Press ENTER to process the action flags.
Type CAN or CANCEL or press PF3 to end.

Query :
Form. :

1. Review Query?.... ===>    (B=Browse, E=Edit, N=None)
2. Edit Variables?.. ===>    (Y=Yes, N=No)
3. Generate Program? ===>    (Y=Yes, N=No)
```

If you press Enter (without entering a command), the action flags will be processed. These flags direct which panels will be displayed next. The Single Report List panel will not be displayed again until all of the flags have been processed, or until an error is encountered in processing the flags.

If you press PF3, the action flags will be ignored and you will return to the Generate Programs panel.

If you type NOCONF and press Enter, the value of the **Confirm Exports?** flag on the Set Default Parameters panel will be set to N.

If you type `CONF` and press Enter, the value of the **Confirm Exports?** flag on the Set Default Parameters panel will be set to `Y`.

If you type `STOPQMF` and press Enter, and if a QMF session has been started to issue export commands, the session will be terminated. This command has no effect when Program Generator was started from within a QMF session.

If you type `EDIT 1` and press Enter, you will edit the previously generated program.

If you type `REGISTER 1` and press Enter, you will proceed to the Register Programs panel with initial values set for registering the program.

If you type `COMPILE 1` and press Enter, you will proceed to the Compile Programs panel with initial values set for preparing the program. See 41" for information on the Compile Programs option.

If you type RUN 1 and press Enter, you will proceed to the Run Programs panel with initial values set for running the program. See "Running programs" on page 49 for information on the Run Programs option.

The fields on the panel are:

Review Query?
Enter `B` to browse the input query, E to edit the input query, or N to do neither.

Edit Variables?
Enter `Y` to proceed to the Edit Variables panel. If this flag is set to N, no action will be taken.

Generate Program?
Enter `Y` to proceed to the Generation Options panel, and to generate a program for this report. If this flag is set to `N`, no action will be taken.

Reviewing the query before generation

You can optionally browse or edit a query before generating a program from it by setting the **Review Query?** action flag to `B` or `E`, respectively, on the Report List panel.

```
BROWSE -- USER.APPL.QUERY(QUERY1) ------------------ LINE 00000000 COL 001 079
COMMAND ===>                                                  SCROLL ===> PAGE
****************************** TOP OF DATA ********************************
****************************** BOTTOM OF DATA ********************************
```

If you press PF3, you will exit from the browse or edit session and the next
panel will be displayed.

Editing variables

QMF queries can contain substitution variables. Before a query is run, QMF
replaces each variable in the query with its value. If a variable does not have
a value (that is, it is unbound) then the query cannot be run.

Variable bindings can be established through the SET GLOBAL and RUN
QUERY commands. With online QMF, a prompt panel is displayed whenever
a query with unbound variables is run. The panel lists each of the unbound
variables with a field in which you can enter its value. With batch QMF,
prompting is not possible. Therefore, the values must be set through
commands in the procedure that invokes the query.

Values for variables

A variable can be replaced with a literal text string. Before the query with the
variable is embedded in the generated program, the variable is simply
replaced by the literal. For example, this query contains a variable named
&VAR1:

```
SELECT &VAR1
  FROM HR.DEPT_TABLE
```

If &VAR1 is given the value NAME, then the query that will be embedded in
the generated program is:

```
SELECT NAME
  FROM HR.DEPT_TABLE
```

In addition, QMF substitution variables can be replaced with host variables .
Host variables can be used to receive values from DB2 or send values to DB2.
For example, this query contains a host variable named:MAXDAYS in the
WHERE clause:

```
SELECT NAME, DEPT
  FROM HR.DEPT_TABLE
 WHERE VACATION_DAYS > :MAXDAYS
```

If:MAXDAYS holds the value of 20 when this query is run, then the predicate
will be evaluated as:

```
WHERE VACATION_DAYS > 20
```

A QMF substitution variable cannot always be replaced by a host variable.
You can convert **some** QMF queries with variables into syntactically correct
embedded SQL with host variables by substituting the variables with host
variable names. However, it is possible to create a QMF query with variables
that cannot be converted into embedded SQL by this substitution. For
example, a QMF query can contain a variable in the FROM clause:

```
SELECT NAME, DEPT
  FROM &TAB
```

It is syntactically incorrect to code embedded SQL with a host variable in a
FROM clause:

```
SELECT NAME, DEPT
  FROM :TAB
```

In a case like this, the &TAB variable must be replaced by a literal string (for
example HR.DEPT_TABLE) as described above.

When specifying a value for a QMF substitution variable, a host variable is
specified by entering a value that begins with a colon (:). Although host
variables are not required to start with a colon in embedded SQL, that
requirement is made for host variables generated here. A value that does not
begin with a colon is processed as a literal string.

The following example shows a query that contains variables, binding values
for those variables, and the resulting embedded SQL

Query with substitution variables:

```
SELECT NAME, &ASOFDATE, DEPT
     FROM &CREATOR.DEPT_TABLE
   WHERE VACATION_DAYS > &MAXDAYS
     AND JOB = &JOB
     AND STATUS = &STATUS
```

Variable binding values:

Variable Name	Value
&ASOFDATE	:TODAYS-DATE
&CREATOR	HR
&MAXDAYS	20
&JOB	'MGR'
&STATUS	:STATUS-IND

SQL embedded in a COBOL program:

```
EXEC SQL DECLARE C1 CURSOR FOR
   SELECT NAME, :TODAYS-DATE, DEPT
      FROM HR.DEPT_TABLE
   WHERE VACATION_DAYS > 20
      AND JOB = 'MGR'
      AND STATUS = :STATUS-IND
END-EXEC.
```

To automatically generate a definition for a host variable and include code to set the value of that variable at runtime, you must specify the host variable's data type as well as its name. When you enter the host variable's name on the Edit Variables panel, you must also enter its data type directly after the name. For example:

Variable Name	Value
&ASOFDATE	:TODAYS-DATE DATE
&STATUS	:STATUS-IND SMALLINT

Valid data types are:

- INTEGER
- SMALLINT
- FLOAT
- DECIMAL
- DECIMAL(p)
- DECIMAL(p,s)
- CHAR(n)
- VARCHAR(n)
- DATE
- TIME
- TIMESTAMP

When the program is generated, a definition of the appropriate type is included for each host variable. For example:

```
01  HOST-VARIABLES.
    03  TODAYS-DATE     IC X(10).
    03  STATUS-IND      PIC S9(4) COMP.
```

Code to read a value for each host variable will also be included in the
generated program.

Edit Variables panel

When you set the **Edit Variables?** action flag to Y, the Edit Variables panel is
displayed. This tabular panel contains two columns: one listing variable
names and the other listing their values. The default value for each variable is
a host variable with the same name. However, if the input to the generation
process was a procedure, then the default setting for a variable comes from a
binding on the RUN QUERY command for that report. If there is no such
binding, the default setting comes from any preceding SET GLOBAL
command. If you do not give appropriate values for each variable, you will
most likely get an SQL error when you try to generate a program from the
query.

```
DB2P ⁄ DB2PLOCATION -- Edit Variables ---------------------------------- 6.1.0
COMMAND ===>                                                  SCROLL ===> PAGE

Overtype variable values to change.
Press ENTER to save variables values.
Type CAN or CANCEL or press PF3 to leave values unchanged.

    Variable Name       Literal Value or Host Variable and Data Type

    ------------------  -------------------------------------------------------

****************************** BOTTOM OF DATA ********************************
```

If you press Enter, all input fields will be validated. If any errors are detected
during input validation, the panel will be redisplayed with an error message.
Otherwise, these variable settings will be saved (and later used if you
generate a program for this report).

If you press PF3, all input fields will be ignored and you will proceed to the
next panel. The previous variable settings will be restored.

If you type ABORT and press Enter, all input fields will be ignored and you will immediately return to the Report List panel. The previous variable settings will be restored.

To replace variables with literals, enter the following field

Literal Value
> Enter the literal value with which to replace this variable. The value can be up to 55 characters in length. It must not start with a colon (:). Leaving this field blank implies a value of a single space.

To replace variables with host variables, enter the following field:

Host Variable and Data Type
> Enter the host variable name, beginning with a colon (:). If you want to create an indicator variable associated with this host variable, enter its name (beginning with a colon) immediately after the host variable name, with no intervening space. You must specify a data type for this host variable by entering it after the name, with at least one space between the name and data type. Valid data types are: SMALLINT, INTEGER, DECIMAL(p,s), DECIMAL(p), DECIMAL, FLOAT, CHAR(n), VARCHAR(n), DATE, TIME, and TIMESTAMP.

Note: If you are specifying a data type for a host variable that will be the target in an SQL LIKE clause , you should specify **VARCHAR(n)** as the type rather than `CHAR(n)`. This is not a requirement of Program Generator; however, DB2's processing of a LIKE clause with a CHAR host variable is non-intuitive. Using the VARCHAR data type usually produces the desired results.

Description of generation options

Before you generate a program, you should be familiar with the various generation options available. These options allow you to control the characteristics of the program that will be generated. Some of the generation options are listed on the Generation Options panel. Other generation options that are used less frequently or that are not usually changed after setting them once are listed on the Extended Generation Options panel. All of these options can directly affect the speed and performance of the generated program.

Environment

You can generate programs for any of the batch, TSO, or CICS environments.

Batch programs are very straightforward. Data is read from an SQL cursor, formatted, and written to the REPORTnn DDs. Once all of the data is read, the report files are closed and the program ends.

TSO programs must be run under TSO and ISPF because they make calls to ISPF dialog manager services. You can generate two types of TSO programs: display programs and print programs.

Display programs allow you to browse the report, in most cases before all of the data is read (just like QMF). When you scroll forward, enough rows are fetched from the cursor to fill up the next panel of formatted report data. However, there are some reports (such as those that have print capability or make use of the ACROSS usage code) that require all of the data to be read before any of the formatted report can be displayed. In these cases, a prompt panel warns you that all of the data must be read, at which time you have the option of canceling the report or continuing.

A print program is a specialized program that is designed to produce a printed version of a report being displayed by a display program. From a display program that has been generated with print capability, issuing the PRINT command invokes a corresponding print program that generates a printed report by either writing to the RAAPRINT DD or by invoking GDDM[2] services if a GDDM printer nickname is specified on the PRINT command.

CICS programs are completely pseudo-conversational. As with TSO programs, you can generate two types of CICS programs: display programs and print programs.

Display programs allow you to browse the report after all of the data is read from DB2 and the cursor is closed. The report data is browsed using the supplied BMS maps. The generated CICS program (not the BMS map) controls the scrolling through the report. Standard PF keys are used to scroll forward (PF8), backward (PF7), left (PF10), and right (PF11). In addition, full ISPF-like scrolling is supported with a command line and a scroll amount field.

CICS print programs perform the same type of function as TSO print programs, but instead write their output to a CICS data queue. The name of the print queue defaults to RAAPnnnn, where nnnn is the terminal ID, but you can override this name on the PRINT command.

Report Presentation Type

The setting of the Report Presentation Type option determines the basic function of the generated program.

2.

Note: Trademark of IBM Corporation.

Specifying **print** will result in a program that formats a report for printed output. This type of report has regular page breaks, and includes a carriage control character as the first character of each line of the report. The QMF PRINT REPORT command generates this type of report.

Specifying **display** for the Report Presentation Type will result in a program that formats a report and displays it online to the user. The QMF DISPLAY REPORT command generates this type of report.

The third option for Report Presentation Type is **neither**. Specifying this option will result in a program that neither prints nor displays a report. The data will simply be fetched, and any other processing (for example, SAVE DATA processing) will be performed. This type of program can also be used as a skeleton or model for other processing that might be desired.

Report Presentation Type for batch programs must be either **print** or `neither`. For TSO and CICS programs it can be `display`, `print`, or `neither`. (TSO and CICS `print` programs are intended to be invoked only from a corresponding `display` program, that is, a program for the same report, using the same host variables.)

You can use non-SELECT, as well as SELECT, queries as input to Program Generator. The options presented above for Report Presentation Type apply only to programs generated from SELECT queries. For programs generated from non-SELECT queries, the concept of a "report" does not have meaning, so this option is not relevant.

SAVE DATA?

You can generate programs with source code to emulate the operation of the SAVE DATA command of QMF. All of the data fetched by the program will be saved to the specified DB2 table. If the table does not exist, it will be created. If it does exist, the generated program will check that the column layout of the query's SELECT clause exactly matches that of the table. If it does not, program execution will terminate with an error. Otherwise, the existing data will optionally be deleted (depending on the ACTION parameter to the SAVE DATA command), and the new data will be inserted.

If the input to the generation process was a procedure that contained a SAVE DATA command, then the table name specified will be displayed as the default on the Generation Options panel. If that SAVE DATA command used the COMMENT parameter, the comment will be put on the table via the COMMENT ON statement.

If the input was not a procedure or was a procedure that did not contain a SAVE DATA command, you can still build a program that performs a SAVE

DATA by manually specifying a table name on the Generation Options panel. A comment for the table cannot be specified in this case.

Programs that perform the SAVE DATA operation incur additional overhead, because they contain dynamic DDL (to create the table) and DML (to delete existing data and insert new data). When binding the plan for such a program, VALIDATE(RUN) should be specified if the program uses static SQL, rather than VALIDATE(BIND). In addition, the user running such a program must have the necessary permissions to create, delete from, insert into, and comment on the target table.

TSO and CICS display programs that perform the SAVE DATA operation must read all of the data for the report from DB2 before displaying a report. This is to ensure that all of the data is saved before exiting the program. This also avoids DB2 holding locks while a user is browsing a report, potentially for a long time.

ERASE TABLE(s)?

You can generate programs with source code to emulate the operation of the ERASE TABLE command of QMF. At the end of a successful run of the program, the specified table will be dropped from DB2 by executing a DROP TABLE SQL statement.

If the input to the generation process was a procedure that contained an ERASE TABLE command, then the table name specified will be displayed as the default on the Generation Options panel. If the procedure contained more than one ERASE TABLE command, then the string *MULTIPLE will be displayed as the default on the Generation Options panel, and the field will be protected. In this case, the names of the tables to be dropped cannot be changed.

If the input was not a procedure or was a procedure that did not contain any ERASE TABLE commands, you can still build a program that performs an ERASE TABLE by manually specifying a table name on the Generation Options panel. More than one table cannot be specified in this case.

Write Data To DATAOUT?

You can generate programs with source code to save data to a sequential file, as opposed to a DB2 table. This feature allows you to eliminate a significant amount of DB2 processing. All of the dynamic DDL and DML associated with saving data to DB2 tables will be omitted from the program, which will reduce tablespace locking contention. As with the SAVE DATA option, you can select this feature even if you are generating from a query or from a procedure with no SAVE DATA command.

Programs generated with this option will write the fetched data to a DD named DATAOUT . Program Generator automatically calculates the minimum LRECL for this DD based on each selected column's length and indicator variable. If you want to specify a different LRECL, you can enter it in the **LRECL** field on the Generation Options panel. If the LRECL field is left blank or contains an asterisk (*), the computed value will be used. You can determine the LRECL that is actually used by looking at the generated program.

You can SAVE DATA to a table **and** to a sequential file in the same program. These options are not mutually exclusive.

TSO display programs that have the print capability are required to enable this option. In this case, the data is written instead to the RAADATA DD . The print program invoked by a display program then reads from the RAADATA DD to format and print its report.

Read Data From DATAIN?

You can generate a program that reads data from a file instead of fetching data from DB2. A query must still be specified to generate the program. The query is used to determine the expected column layout of the input file. However, the program will not contain any SQL statements to fetch data using the input query. Instead, it will read the input data directly from a DD named DATAIN . A typical use of this option is to read data from a sequential file that was written by another program generated with the **Write Data To DATAOUT?** option set to **yes**.

Any predicates specified in the input query (in its WHERE clause) will not be used when reading the data from a sequential file. To obtain the same effect as the SQL statement, any predicate filters must be manually added to the generated program.

TSO print programs are required to enable this option. These programs read data from the RAADATA DD that was written by their corresponding display programs.

Online Print Program Name

Online print programs provide print functionality from TSO and CICS display programs. While viewing a report online, you can request a printed version of that same report by entering the PRINT command. Upon such a request, the display program (if it has been so enabled) invokes the online print program to print the report to the RAAPRINT DD or a GDDM printer (for TSO programs) or to a CICS temporary storage or transient data queue (for CICS programs).

For TSO programs, you can specify a GDDM printer nickname on the PRINT command. If you do not specify a nickname, the report will be written to the RAAPRINT DD. For CICS programs, you can specify the name and type of the desired queue on the PRINT command. If you do not specify these values, the report will be written to a temporary storage queue named RAAPnnnn, where nnnn is the terminal ID.

For TSO programs, the syntax of the PRINT command is:

```
PRINT (PRINTER=nickname
```

where nickname is the name of a GDDM printer. The (PRINTER=nickname parameter is optional. If it is omitted, the report will be written to the RAAPRINT DD (which should be allocated **before** running the program).

For CICS programs, the syntax of the PRINT command is:

```
PRINT queuename queuetype
```

where queuename is the name of the CICS data queue (up to eight characters) used to contain the printed report and queuetype is the type of that queue (TS or TD). If queuetype is omitted, it defaults to TS. If queuename is omitted, it defaults to RAAPnnnn.

To achieve print functionality, you must follow two steps. First, you must generate an online print program (a program with TSO or CICS for environment and print for report presentation type) with a particular name, for example Q1PRINT. Second, you must generate a TSO or CICS display program, for example Q1DISP. When you generate Q1DISP, you must fill in the **Online Print Program Name** field with Q1PRINT, specifying Q1PRINT as the print program.

For CICS programs, PPT entries for both the display and print programs must be defined to CICS.

Note: The display program and any print program that it invokes must use exactly the same host variables. Values for the host variables used by the print program are passed directly from the display program. Any mismatch between the two programs' host variables will result in errors.

DB2 Connection Type

Programs that contain embedded SQL statements need to connect to DB2 before executing those statements. You choose the type of DB2 connection used by generated batch and TSO programs: the TSO attachment facility or the call attachment facility . (CICS programs always use the CICS attachment facility to connect to DB2.)

Using the TSO attachment facility entails running TSO and executing the program via the DSN command processor. Under TSO, you supply the DSN commands needed to run the program and plan.

The call attachment facility (CAF) can be used as an alternate method for connecting to DB2. A program using CAF includes routines to directly call the various DB2 attachment routines. This method of connecting to DB2 allows you to execute the program directly, instead of via TSO. Using this method allows you to reduce start-up and overhead costs.

CAF Module Usage

There are two types of call attachment options available:
- AACAF
- DSNALI

AACAF (supplied as an alias of RAACAF in QMFHPO.SRAALOAD) is link-edited with the generated program. At runtime, AACAF dynamically loads the standard DB2 CAF module DSNALI. There are two advantages to using the AACAF module. First, because the DB2 module is dynamically loaded at runtime, you will not have to re-link the generated program if your DB2 version changes. If DSNALI is link-edited with the generated program, then you have to re-link the program when DSNALI changes. The second advantage to using the AACAF module is that under DB2 Version 2 Release 2, the reason code associated with CAF errors is not easily accessible to COBOL programs. The AACAF module provides this reason code in a convenient format.

DSNALI (a DB2-supplied module) is link-edited with the generated program.

The only restriction on which CAF option you use is that proc programs (and the report programs they run) should not use DSNALI under DB2 Version 2 Release 2. These programs rely on the reason code value returned by DSNALI, which is not easily accessible to COBOL programs in this case.

SQL Type

You can generate programs that use either static or dynamic SQL. In most cases, static SQL will probably be the desired choice because it results in the utilization of less CPU time by the generated program. However, in some cases, you might want to use dynamic SQL . For example, programs that use dynamic SQL are able to work with Information Builders, Inc's. EDA/Dynamic Extender for DB2[3]. Dynamic SQL also allows more flexibility in the SQL that

---

3.

is run. For example, unqualified SQL object names will be qualified by the current SQLID at runtime rather than by the primary SQLID at generate and compile time.

In general, you should choose static SQL unless there is a specific need for the functionality of dynamic SQL.

HPO/Sort?

If the HPO/Sort option is specified, Program Generator will automatically remove (by commenting out) any ORDER BY clause in the input query, and instead generate a program that invokes a COBOL internal sort . This feature can greatly reduce CPU time consumption, as an internal sort is usually more efficient than sorting done by DB2. However, because DB2 can make use of indexes and clustering to effect a sort without actually sorting, you should use this option with caution. If you know that DB2 will invoke a sort to satisfy an ORDER BY clause, replacing it with an internal sort will reduce CPU usage.

This option causes the generated program to read and release to the sort program the entire set of qualifying rows. These rows are sorted and returned to the generated program and the report processing continues. You should be familiar with the sort program (for example, DFSORT) that is enabled at your site. You may need to include additional file input to set in-core sort sizes and other sort parameters to make the program as efficient as possible.

For documentation purposes, the query embedded in the generated program will still contain the ORDER BY clause in the form of a comment.

HPO/Runtime?

If the HPO/Runtime option is specified, Program Generator will generate a program that makes calls to runtime routines. The program will contain fewer lines of code, as most of the data processing will be performed in the common routines. Because the program will have fewer lines of code, it will be easier to maintain.

If this option is not specified, Program Generator will generate a program that does not rely on **any** support routines at runtime. In fact, this type of program does not have any special linkage requirements either. You can generate a completely self-contained, standalone program. This type of program has more lines of code because all of the data processing is performed in the program.

Note: Trademark of Information Builders, Inc.

DSNTIAR Calls?

If the DSNTIAR Calls? option is set to **yes**, the generated program will include static calls to the standard DB2 DSNTIAR routine to retrieve formatted SQL error message texts when SQL errors occur. If portability to other platforms is important, then these calls can be omitted. In this case, only SQL error codes are returned when SQL errors occur.

RAACPY Calls?

If the RAACPY Calls? option is set to **yes**, the generated program will include static calls to the RAACPY routine. The use of this option sacrifices portability in favor of improved performance. COBOL source code for the RAACPY routine is provided in QMFHPO.SRAASAMP.

Report Width, Report Length, DateTime, and PageNo

Four options to the QMF PRINT REPORT command are used by the generated program to determine the appearance of the printed report. These are WIDTH, LENGTH, DATETIME, and PAGENO. These four options are taken from any PRINT REPORT commands in an input procedure or (in the case of WIDTH and LENGTH) from the QMF profile. You can, however, override the values used for these options during the generation process.

Width can be from 22 to 999 characters. Length can be CONT, meaning the report should contain no page breaks, or from 1 to 999 lines. DateTime can be **yes** or **no**, and determines whether the date and time are added to the bottom of each page of the printed report. PageNo can be **yes** or **no**, and determines whether the page number is added to the bottom of each page of the printed report. These options are only relevant for a printed report.

Host Variable File LRECL

Batch programs that use host variables read values for those variables from the HOSTVARS DD . You can specify the LRECL of the HOSTVARS DD, or allow it to default to 80.

Tabular Host Variables? and Host Variable Delimiter

Host variable values in the HOSTVARS DD can be specified in one of two ways. The HOSTVARS DD can contain one value per record, or it can contain all of the values on one record, separated by a delimiter character. In the latter case, you can specify the delimiter character as part of the generation process.

More than one set of host variable values can be specified in the HOSTVARS DD. Batch programs that use host variables will continue reading the HOSTVARS DD as long as variable values are available, producing multiple

versions of the report for each set of variable values. If the values are specified one per record, this means that a report will be generated for each block of records in the HOSTVARS DD that form a complete host variable set. If the values are specified in tabular format, this means that a report will be generated for each record in the HOSTVARS DD.

Programs that will be run from the End User Facility cannot use tabular host variables.

Program Author

You can specify the value to use for the AUTHOR field in OS/VS COBOL and VS COBOL II programs as part of the generation process.

Note: The following two parameters (Spill File and Buffering) affect the execution and performance of HPO/Runtime programs, but cannot be set from the Generation Options panel. They can only be changed by manually modifying the generated source code. They are **not** applicable to standalone programs.

Spill File

Most HPO/Runtime programs require a fixed amount of memory to run. However, HPO/Runtime programs generated from forms which contain certain QMF usage codes require all of the data to be fetched before the report can be written. Such programs will perform this function automatically, however, the data must be buffered as it is read. This buffering is done in memory by default, due to efficiency concerns. For very large tables, though, memory may be exhausted before all of the data is read. Because of this, a program can be directed to instead make use of a spill file for buffering the data. This is done by setting the value of the USE-SPILL-FILE variable in the generated program. A value of 0 for this variable (the default) indicates that buffering should be done in memory. A value of 1 indicates that a spill file should be used.

When a program that uses a spill file runs, it uses a DD named RAASPILL for the spill file. This DD should be defined as a temporary file, for example:

```
//RAASPILL  DD    UNIT=SYSDA,SPACE=(CYL,(50,50))
```

Buffering

When an HPO/Runtime program runs, it repeatedly calls the HPO runtime modules to process the fetched data. On each call to the runtime modules, the program passes a buffer containing some number of rows of data, along with a count of how many rows are in the buffer. The number of rows in each buffer passed to the library has a direct impact on the performance of the

program because each call to the library incurs an overhead cost. Thus, if the library is called every time a row is fetched, a substantial cost in overhead is incurred. If some number of rows are buffered together, the number of calls is reduced, and so is the overhead associated with the calls. As a result, a large buffer size should be used to improve performance.

On the other hand, the buffer size is limited by the amount of memory available to the executing program. (Additionally, some compilers put a restriction on the maximum size of objects defined in programs, thus limiting the size of the buffer.) The buffer size should be set as large as possible, within any such limits.

To change the number of rows per buffer in a OS/VS COBOL or VS COBOL II program, three items in the working storage section must be set to that number: the value of the variable FB-INDEX-MAX, and the OCCURS clause on both FETCH-BLOCK and INDICATORS-BLOCK variables. This specifies the number of rows per buffer, **not**the total buffer size-the buffer size is the number of rows per buffer times the size of each row.

Setting generation options

If you set the **Generate Program?** action flag to Y, the Generation Options panel will be displayed. See 19" for more information about the options on this panel.

```
DB2P / DB2PLOCATION -- Generation Options ------------------------------ 6.1.0
COMMAND ===>

Query :                              Form :
--------------------------------------------------------------------------------
Program Options...
1a. Program/Plan Name........... ===>
  b. Environment................ ===>    (B=Batch, T=TSO, C=CICS)
  c. Report Presentation Type.... ===>    (P=Print, D=Display, N=Neither)
  d. SAVE DATA? (Y/N)............ ===>    Table ===>
  e. ERASE TABLE(s)? (Y/N)....... ===>    Table ===>
  f. Write Data To DATAOUT? (Y/N) ===>    LRECL ===>
  g. Read Data From DATAIN? (Y/N) ===>    LRECL ===>
  h. Online Print Program Name... ===>
  i. Set Extended Options? (Y/N). ===>

Write Source Code To...
2a. Data Set ===>
  b. Member.. ===>             (blank=Program/Plan Name)

Actions After Generation...
3a. Review Program? (B/E/N) ===>          b. Register Program? (Y/N) ===>
  c. Compile Program? (Y/N). ===>          d. Run Program? (Y/N)..... ===>
```

If you press Enter, all input fields will be validated. If any errors are detected during input validation, the panel will be redisplayed with an error message. Otherwise, the program will be generated with the specified options. After generation, any post-generation actions that you selected on this panel will be processed. After that, the next panel will be displayed. If there is an error in any of this processing, you will return directly to the Report List panel.

If you press PF3, all input fields will be ignored and you will proceed to the next panel. No generation will take place.

If you type ABORT and press Enter, all input fields will be ignored and you will immediately return to the Report List panel. No generation will take place.

The fields on the panel are:

Program/Plan Name
> Enter the name of the program to generate. The name entered must conform to plan and program ID naming rules.

Environment
> Enter B to generate an MVS batch program, T to generate an online TSO program, or C to generate an online CICS program. This option must be set to B or T for a non-SELECT query.

Report Presentation Type
> Enter P if the generated program should print a report, D if it should display a report online, or N if it should do neither. This option must be set to P or N for a batch program, and P, D, or N for a TSO or CICS program. This option is disabled for a non-SELECT query.

SAVE DATA?
> Enter Y to generate a program that saves fetched data to a DB2 table, mimicking the QMF SAVE DATA command. A table name must be specified in the next field. This option must be set to N for a TSO or CICS print program. This option is disabled for a non-SELECT query.

Table Enter the name of the table in which to save fetched data. The name should be fully qualified, and should not be referenced in the input query. This option is ignored if the **SAVE DATA?** flag is N. This option is disabled for a non-SELECT query.

ERASE TABLE(s)?
> Enter Y to generate a program that drops the specified DB2 table or tables at the end of its run, mimicking the QMF ERASE TABLE command. A table name must be specified in the next field. This option must be set to N for a TSO or CICS print program. This option is disabled for a non-SELECT query.

Table   If the input to the generation process was a procedure that contained more than one ERASE TABLE command for this report, then this field will contain the value *MULTIPLE, and will be disabled. In this case, the names of the tables to be dropped cannot be changed. Otherwise, use this field to enter the name of a table to drop. This option is ignored if the **ERASE TABLE(s)?** flag is N. This option is disabled for a non-SELECT query.

Write Data To DATAOUT?
Enter Y to write fetched data to the DD named DATAOUT. This is analogous to the SAVE DATA option to write data to a DB2 table. This option must be set to N for a CICS program. This option must be set to Y for a TSO display program if an online print program is specified. This option must be set to N for a TSO print program. This option is disabled for a non-SELECT query.

LRECL
Enter the LRECL to use for the DATAOUT DD when the **Write Data To DATAOUT?** flag is Y. If this field is blank or contains an asterisk (*), the minimum LRECL dictated by the data will be used. This option is ignored if the **Write Data To DATAOUT?** flag is N. This option is disabled for a non-SELECT query.

Read Data From DATAIN?
Enter Y to read data from the DD named DATAIN rather than from DB2. This option must be set to N for a CICS program. This option must be set to Y for a TSO print program. This option is disabled for a non-SELECT query.

LRECL
Enter the LRECL to use for the DATAIN DD when the **Read Data From DATAIN?** flag is Y. If this field is blank or contains an asterisk (*), the minimum LRECL dictated by the data will be used. This option is ignored if the **Read Data From DATAIN?** flag is N. This option is disabled for a non-SELECT query.

Online Print Program Name
If this program is a TSO or CICS display program, then the name of a program may be specified here that will be invoked when a user enters the PRINT command from the display program. The program invoked should be an online print program for the same query and form, using the same host variables (if any). This field must be left blank for a batch program or a non-display program. This field is disabled for a non-SELECT query.

Set Extended Options?
Enter Y to proceed to the Extended Generation Options panel to

review and set extended options for this program. If you enter `N`, the extended options will not be reviewed, and the last values set will be used.

Source Code Data Set
Enter the data set to which the generated program should be written. The data set must exist. If the name is enclosed in single quotes, it is taken to be a fully qualified TSO data set name. Otherwise, your current TSO profile prefix is used to qualify the name.

Source Code Member
If the specified **Source Code Data Set** is a PDS, this is the member to which the generated program should be written. If you leave this field blank, then the value in the `Program-Plan Name` field will be used. If the `Source Code Data Set` is not a PDS, this field must be left blank.

Review Program?
Enter `B` to browse the program after it is generated, `E` to edit the program after it is generated, or N to do neither.

Register Program?
Enter `Y` to proceed to the Register Program panel after generation. Enter `N` if you do not want to register the program with the End User Facility.

Compile Program?
Enter `Y` to proceed to the Compile Programs panel after generation. Enter `N` if you do not want to compile the program.

Run Program?
Enter `Y` to proceed to the Run Programs panel after generation. Enter `N` if you do not want to run the program. This option must be set to `N` for a CICS program.

Setting extended generation options

If you set the **Set Extended Options?** flag on the Generation Options panel to `Y`, the Extended Generation Options panel will be displayed. See "Description of generation options" on page 19 for more information about the options on this panel.

```
DB2P / DB2PLOCATION -- Extended Generation Options --------------------- 6.1.0
COMMAND ===>
Query :                           Form :
--------------------------------------------------------------------------------
  1. COBOL Source Language....... ===>   (1=OS/VS, 2=VS-II, 370, or MVS)
  2. DB2 Connection Type......... ===>   (C=CAF, T=TSO)
  3. CAF Module Usage............ ===>   (H=HPO CAF, D=DB2 CAF)
  4. SQL Type.................... ===>   (S=Static, D=Dynamic)
  5. HPO/Sort? (Y/N)............. ===>
  6. HPO/Runtime? (Y/N).......... ===>
  7. DSNTIAR Calls? (Y/N)........ ===>
  8. RAACPY Calls? (Y/N)......... ===>
  9. Report Width................ ===>
 10. Report Length............... ===>
 11. DATETIME? (Y/N)............. ===>
 12. PAGENO? (Y/N).............. ===>
 13. Host Variable File LRECL.... ===>
 14. Tabular Host Vars? (Y/N).... ===>
 15. Host Variable Delimiter..... ===>
 16. Program Author............. ===>
```

If you press Enter, all input fields will be validated. If any errors are detected
during input validation, the panel will be redisplayed with an error message.
Otherwise, you will return to the Generation Options panel to continue the
generation process, using the new values.

If you press PF3, all input fields will be ignored and you will return to the
Generation Options panel.

The fields on the panel are:

COBOL Source Language
> Enter 1 to generate an OS/VS COBOL program or 2 to generate a VS
> COBOL II program. Since VS COBOL II is source compatible with
> AD/Cycle COBOL/370 and COBOL for MVS, you should specify 2 if
> you are using either of those products.

DB2 Connection Type
> Enter C to generate a program that uses the call attachment facility or
> T to generate a program that uses the TSO attachment facility. This
> option is ignored for a CICS program.

CAF Module Usage
> Enter H to generate a program that uses the HPO call attachment
> module (AACAF), or D to generate a program that uses the DB2 call
> attachment module (DSNALI). You should enter H if this program
> will be run as part of a procedure under DB2 Version 2 Release 2. This
> option is ignored if **DB2 Connection Type** is not C.

SQL Type

Enter S to generate a program that uses static SQL, or D to generate a program that uses dynamic SQL.

HPO/Sort?

Enter Y to replace an ORDER BY clause in the query with a COBOL internal sort. If you enter N, any ORDER BY clause will not be replaced. This option must be set to N for a CICS program. This option must be set to N for a TSO print program. This option is disabled for a non-SELECT query.

HPO/Runtime?

Enter Y to generate a program that requires the HPO runtime modules. Enter N to generate a program that is fully standalone (that is, does not require the HPO runtime modules). This option must be set to N for a CICS program. This option must be set to N for a TSO display program if an online print program is specified. This option must be set to N for a TSO print program. This option is disabled for a non-SELECT query.

DSNTIAR Calls?

Enter Y to include static calls to the DSNTIAR routine in the generated program to retrieve SQL error message texts. Enter N to omit those calls, so that the generated program will produce only SQL return codes (without message texts).

RAACPY Calls?

Enter Y to include static calls to the RAACPY routine in the generated program to further improve the program's performance. Enter N to omit those calls, so that the generated program will be fully standalone. This option is disabled for a non-SELECT query.

Report Width

Enter the page width (from 22 to 999) to use when generating the report. This field is disabled for a non-print program and for a non-SELECT query.

Report Length

Enter the page length (from 1 to 999, or CONT) to use when generating the report. This field is disabled for a non-print program and for a non-SELECT query.

DATETIME?

Enter Y to include the date and time in a printed report's page footing. Enter N to omit the date and time. This field is disabled for a non-print program and for a non-SELECT query.

PAGENO?

Enter Y to include the page number in a printed report's page footing.

Enter N to omit the page number. This field is disabled for a non-print program and for a non-SELECT query.

Host Variable File LRECL
> Enter the LRECL that should be used for the HOSTVARS DD at runtime. The default value is 80. This field is disabled for a non-batch program or a program that does not use host variables.

Tabular Host Vars?
> This option specifies how host variable values will be specified to the generated program. Enter Y if you want to specify all of the values on a single record separated by a specified delimiter character. Enter N to specify one value per record. Enter N if this program will be run from the End User Facility. This field is disabled for a non-batch program or a program that does not use host variables.

Host Variable Delimiter
> Enter the character that will be used to separate multiple host variable values on a single record. This field is only used when the **Tabular Host Vars?** flag is set to Y. This field is disabled for a non-batch program or a program that does not use host variables.

Program Author
> Enter the value to use as the program author in the generated program.

Generating proc programs

If the input to the generation process was a procedure, you have the option of generating a proc program. This type of program acts as a driver to run each of the procedure's report programs in sequence.

Note: To generate a proc program, you must first generate each of the report programs it will run. In addition, each of these report programs must have the same characteristics. For example, they must all be batch programs, all TSO programs, or all CICS programs.

Setting proc program generation options

If you set the **Generate Proc Program?** flag on the Report List panel to Y, the Proc Program Generation Options panel will be displayed.

```
DB2P / DB2PLOCATION -- Proc Program Generation Options ------------------ 6.1.0
COMMAND ===>
Procedure :
--------------------------------------------------------------------------------
Program Options...
1a. Program/Plan Name............... ===>
  b. COBOL Source Language........... ===>    (1=OS/VS, 2=VS-II, 370, or MVS)
  c. Environment..................... ===>    (B=Batch, T=TSO, C=CICS)
  d. DB2 Connection Type............. ===>    (C=CAF, T=TSO)
  e. CAF Module Usage................ ===>    (H=HPO CAF, D=DB2 CAF)
  f. Program Author.................. ===>
  g. Select All Report Programs? (Y/N) ===>

Write Source Code To:

2a. Data Set ===>
  b. Member.. ===>          (blank=Program/Plan Name)

Actions After Generation:

3a. Review Program? (B/E/N) ===>          b. Register Program? (Y/N) ===>
  c. Compile Program? (Y/N). ===>          d. Run Program? (Y/N)..... ===>
```

If you press Enter, all input fields will be validated. If any errors are detected
during input validation, the panel will be redisplayed with an error message.
Otherwise, if the **Select All Report Programs?** flag is set to N, you will
proceed to the Select Report Programs panel. Otherwise, the program will be
generated with the specified options. After generation, any post-generation
actions that you selected on this panel will be processed. After that, you will
return directly to the Report List panel.

If you press PF3, all input fields will be ignored and you will return directly
to the Report List panel. No generation will take place.

If you type ABORT and press Enter, all input fields will be ignored and you
will immediately return to the Report List panel. No generation will take
place.

The fields on the panel are:

Program/Plan Name
>   Enter the name of the program to generate. The name entered must
>   conform to plan and program ID naming rules.

COBOL Source Language
>   Enter 1 to generate an OS/VS COBOL program or 2 to generate a VS
>   COBOL II program. Since VS COBOL II is source compatible with
>   AD/Cycle COBOL/370 and COBOL for MVS, you should specify 2 if
>   you are using either of those products.

Environment

Enter B to generate an MVS batch program, T to generate an online TSO program, or C to generate an online CICS program.

DB2 Connection Type

Enter C to generate a program that uses the call attachment facility or T to generate a program that uses the TSO attachment facility. This option is ignored for a CICS program.

CAF Module Usage

Enter H to generate a program that uses the HPO call attachment module (AACAF), or D to generate a program that uses the DB2 call attachment module (DSNALI). You should enter H if this program will be run under DB2 Version 2 Release 2. This option is ignored if **DB2 Connection Type** is not C.

Program Author

Enter the value to use as the program author in the generated program.

Select All Report Programs?

Enter Y if the generated program should run all of the reports in the current Report List. If you enter N, a selection list will be displayed allowing you to select the reports the proc program should run.

Source Code Data Set

Enter the data set to which the generated program should be written. The data set must exist. If the name is enclosed in single quotes, it is taken to be a fully qualified TSO data set name. Otherwise, your current TSO profile prefix is used to qualify the name.

Source Code Member

If the specified **Source Code Data Set** is a PDS, this is the member to which the generated program should be written. If you leave this field blank, then the value in the **Program~Plan Name** field will be used. If the **Source Code Data Set** is not a PDS, this field must be left blank.

Review Program?

Enter B to browse the program after it is generated, E to edit the program after it is generated, or N to do neither.

Register Program?

Enter Y to proceed to the Register Program panel after generation. Enter N if you do not want to register the program with the End User Facility.

Compile Program?

Enter Y to proceed to the Compile Programs panel after generation. Enter N if you do not want to compile the program.

Run Program?

>Enter Y to proceed to the Run Programs panel after generation. Enter
N if you do not want to run the program. This option must be set to N
for a CICS program.

Selecting report programs

If you set the **Select All Report Programs?** flag on the Proc Program
Generation Options panel to N, the Select Report Programs panel will be
displayed. From this panel, you can select the reports the proc program
should run.

```
DB2P / DB2PLOCATION -- Select Report Programs -------------------------- 6.1.0
COMMAND ===>                                                 SCROLL ===> PAGE
Use Y or N to select report programs.
Press ENTER to process.
Type CAN or CANCEL or press PF3 to end.

Browse Procedure? (Y/N) ===>
                                                       Program
Num Query                         Form                 Name      Select?
--- -------------------------- -------------------------- -------- -------

****************************** BOTTOM OF DATA ******************************
```

If you press Enter, all input fields will be validated. If any errors are detected
during input validation, the panel will be redisplayed with an error message.
Otherwise, the proc program will be generated for the selected reports. After
generation, any actions for after generation that you selected on the Proc
Program Generation Options panel will be processed. After that, you will
return directly to the Report List panel.

If you press PF3, all input fields will be ignored and you will return directly
to the Report List panel. No generation will take place.

If you type ABORT and press Enter, all input fields will be ignored and you will
immediately return to the Report List panel. No generation will take place.

The fields on the panel are:

Browse Procedure?

If this flag is set to Y, then a browse session will be started displaying the input procedure. If it is set to N, then the input procedure will not be browsed.

Select?

Enter Y to include this report in those that the proc program will run. All report programs run by the proc program must have the same characteristics, for example, they must all be batch programs, all TSO programs, or all CICS programs.

Generating programs with the short dialog

Selecting option 2 from the Program Generator Menu brings you to the Generate Programs (Short Dialog) panel . This panel can also be reached directly by issuing the following TSO command:

```
CALL 'QMFHPO.SRAALOAD(RAAMAIN)' 'CO 2'
```

The Short Dialog option follows the same procedure as the Full Dialog option. However, it suppresses all panel displays for locating queries and forms, exporting queries, processing Report List entries, generating programs, preparing programs, and running programs. When you press Enter on the Generate Programs (Short Dialog) panel, all specified report programs are generated, prepared, and run according to the default parameter settings and current generation options.

The only panel that **will** be displayed is the Edit Variables panel . If any query specified as input uses substitution variables, or if the input to the generation process is a procedure that contains SET GLOBAL commands, the Edit Variables panel will be displayed allowing values to be specified for all substitution variables.

Note: This form of generation is recommended only for the more advanced user because a potentially large amount of processing can take place without any opportunity for interruption.

```
DB2P / DB2PLOCATION -- Generate Programs (Short Dialog) ---------------- 6.1.0
COMMAND ===>

Use % and _ as wildcard characters to produce a list of objects.
Press ENTER to generate program(s).
Type CAN or CANCEL or press PF3 to end.

Generate programs from one of the following:

1. Query Name.... ===>

2. Query Name.... ===>
     Form Name..... ===>

3. Procedure Name ===>
```

If you press Enter, all input fields will be validated. If any errors are detected during input validation, the panel will be redisplayed with an error message. Otherwise, the entire program generation process will be performed.

If you press PF3, all input fields will be ignored and you will return to the Program Generator Menu.

Generating programs with batch JCL

Programs can also be generated using batch JCL. The batch JCL executes TSO (IKJEFT01) and issues the ISPSTART command to run the main program named RAAMAIN under ISPF. The input query, query and form, or procedure are passed as parameters into RAAMAIN as shown in the example below.

All of the option settings usually displayed and set on the Program Generator panels will instead be obtained directly from the ISPF profile data set allocated to the ISPPROF DD. Generating programs in batch is like generating programs using the short dialogæonce the input query and form are specified, the program is generated, compiled, and run according to the default settings.

Values for variables that normally would be specified on the Edit Variables panel are supplied in the DD named RAAVARS . Each line of this file should be of the form:

&VARNAME=VARVALUE

where &VARNAME is the name of the variable and VARVALUE is the value to supply for that variable. There should be no spaces on either side of the equal

sign (=). The RAAVARS file should be sorted alphabetically. Any variables for which values are not supplied will use the default value.

The following JCL sample will generate a program from a query named QUERY1 and a form named FORM1. The first parameter passed to RAAMAIN is CO. This tells RAAMAIN to run Program Generator. This JCL contains values for two variables in the RAAVARS DD, &VAR1 and &VAR2. This JCL also allocates the necessary DDs for QMF and DB2. Because the facility may have to start QMF and export objects, the QMF and DB2 libraries must be allocated appropriately.

```
//QMFHPOC    EXEC  PGM=IKJEFT01,DYNAMNBR=30,REGION=2M
//SYSTSIN    DD    *
  ISPSTART PGM(RAAMAIN) NEWAPPL(RAAX) +
         PARM(CO =BATCH =QUERY=QUERY1 =FORM=FORM1)
/*
//RAAVARS    DD    *
&VAR1=20
&VAR2=:HOSTVAR1 SMALLINT
/*
//SYSTSPRT   DD    SYSOUT=*
//STEPLIB    DD    DSN=QMFHPO.SRAALOAD,DISP=SHR
//           DD    DSN=QMF610.DSQLOAD,DISP=SHR
//           DD    DSN=DSN310.SDSNLOAD,DISP=SHR
//SYSPROC    DD    DSN=QMFHPO.SRAACLST,DISP=SHR
//           DD    DSN=QMFHPO.SRAAEXEC,DISP=SHR
//           DD    DSN=QMF610.DSQCLSTE,DISP=SHR
//           DD    DSN=DSN310.SDSNCLIST,DISP=SHR
//SYSEXEC    DD    DSN=QMFHPO.SRAAEXEC,DISP=SHR
//           DD    DSN=QMF610.DSQEXECE,DISP=SHR
//ISPLOG     DD    SYSOUT=*,
//              DCB=(LRECL=133,RECFM=VBA,BLKSIZE=137)
//ISPPROF    DD    DSN=USER.ISPF.ISPPROF,DISP=SHR
//ISPMLIB    DD    DSN=QMFHPO.SRAAISPM,DISP=SHR
//           DD    DSN=QMF610.DSQMLIBE,DISP=SH
//           DD    DSN=DSN310.SDSNSPFM,DISP=SHR
//ISPPLIB    DD    DSN=QMFHPO.SRAAISPP,DISP=SHR
//           DD    DSN=QMF610.DSQPLIBE,DISP=SHR
//           DD    DSN=DSN310.SDSNSPFP,DISP=SHR
//ISPTLIB    DD    DSN=QMF610.DSQTLIBE,DISP=SHR
//DSQDEBUG   DD    SYSOUT=*,
//              DCB=(RECFM=FBA,LRECL=121,BLKSIZE=12100)
//RAADEBUG   DD    SYSOUT=*,
//              DCB=(RECFM=FBA,LRECL=121,BLKSIZE=12100)
//ADMGGMAP   DD    DSN=QMF610.DSQMAPE,DISP=SHR
```

Preparing programs

After you have generated program source code, you must prepare it before you can run the program. Three methods of preparing programs are supported: online preparation without prompting, online preparation with prompting, and batch preparation.

Online preparation without prompts

After the program is generated, you can prepare it online while you wait. A CLIST named RAADSNH is distributed that passes parameters directly to the DB2 DSNH command. Without customization, RAADSNH passes a small subset of parameters to DSNH (such as PLAN and HOST). RAADSNH can be customized during the installation process to pass any set of parameters to DSNH.

Online preparation with prompts

Another option is to prepare the program online with prompting for parameter values. With this option, the RAADSNH CLIST invokes DB2I Program Preparation , which prompts you for library names, library concatenations, bind parameters, and so on, before DSNH is executed.

Online preparation implementation

When you request an online preparation, the RAADSNH CLIST is invoked and passed the information that was specified on the Compile Programs panel. If a non-prompted prepare was specified, the DB2 DSNH command is invoked directly, passing on the information. If a prompted prepare was specified, the information is placed into ISPF shared pool variables. The DB2I Program Preparation option is then invoked, which uses those variable values.

There is one important difference between prompted and non-prompted compiles. When DSNH is invoked directly, it is passed the names of system libraries, for example, your site's COBOL load library (this information is optionally specified to the HPO Configuration Dialog). When DB2I Program Preparation is invoked, this information cannot be specified. In this case, the default values for these parameters (as specified in the DSNH CLIST) are used.

Automatic batch preparation

Batch JCL to prepare programs can be automatically generated, edited, and submitted.

Compile programs option

Selecting option 3 from the Program Generator Menu brings you to the Compile Programs panel . You can also invoke this panel by issuing the following TSO command:

```
CALL 'QMFHPO.SRAALOAD(RAAMAIN)' 'CO 3'
```

On this panel, you must specify basic information about the program to prepare. This information is used to actually invoke the preparation process.

```
DB2P / DB2PLOCATION -- Compile Programs ----------------------------- 6.1.0
COMMAND ===>

Press ENTER to compile program.
Type CAN or CANCEL or press PF3 to bypass this compilation.

  1. Compile Type.......... ===>          (P=Prompted, N=Non-prompted, B=Batch)
  2. Source Data Set........ ===>
  3. Source Member.......... ===>
  4. COBOL Source Language.. ===>          (1=OS/VS, 2=VS-II, 370, or MVS)
  5. Environment............ ===>          (B=Batch, T=TSO, C=CICS)
  6. DB2 Connection Type.... ===>          (C=CAF, T=TSO)
  7. CAF Module Usage....... ===>          (H=HPO, D=DB2)
  8. Compile Options........ ===>
  9. DBRM Library........... ===>
 10. Perform Bind? (Y/N).... ===>
 11. Plan Name.............. ===>
 12. BIND Owner Parameter... ===>
 13. BIND Validate Parameter ===>          (BIND or RUN)
 14. Target Load Library.... ===>
 15. Link Edit Options...... ===>
 16. DSNH PRINT Parameter... ===>          (Prompted and Non-prompted only)
```

If you press Enter, all input fields will be validated. If any errors are detected
during input validation, the panel will be redisplayed with an error message.
Otherwise, the specified compilation will be invoked online, or the Batch Job
Information panel will be displayed, after which the JCL to compile the
program will be edited or submitted. Depending on how this panel was
reached, two things can happen after the compilation. If this panel was
displayed by selecting the Compile Programs option from the Program
Generator Menu, it will be redisplayed after the compilation. If it was
displayed due to a request to compile a program after generation (on the
Generation Options panel), the next panel in the generation process will be
displayed.

If you press PF3, all input fields will be ignored and you will either return to
the Program Generator Menu or proceed with the generation process. No
compilation will take place.

If you type ABORT and press Enter, all input fields will be ignored and you
will immediately return to either the Program Generator Menu or the Report
List panel. No compilation will take place.

The fields on the panel are:

Compile Type

> Enter P to invoke a prompted compilation, via the Program
> Preparation option of DB2 Interactive (DB2I). Enter N to invoke a
> non-prompted compilation by invoking the DSNH command directly.
> Enter B to tailor JCL to compile the program in batch.

Source Data Set

Enter the data set containing the source program to compile. The data set must exist. If the name is enclosed in single quotes, it is taken to be a fully qualified TSO data set name. Otherwise, your current TSO profile prefix is used to qualify the name.

Source Member

If the specified **Source Data Set** is a PDS, this is the member containing the source program to compile. If the `Source Data Set` is not a PDS, this field must be left blank.

COBOL Source Language

Enter `1` if the program to be compiled is an OS/VS COBOL program or `2` if it is a VS COBOL II program. Since VS COBOL II is source compatible with AD/Cycle COBOL/370 and COBOL for MVS, you should specify `2` if you are using either of those products.

Environment

Enter `B` if the program to be compiled is an MVS batch program, `T` if it is an online TSO program, or `C` if it is an online CICS program.

DB2 Connection Type

Enter `C` if the program to be compiled uses the call attachment facility or `T` if it uses the TSO attachment facility. This option is ignored for a CICS program.

CAF Module Usage

Enter `H` if the program to be compiled uses the HPO call attachment module (AACAF), or `D` if it uses the DB2 call attachment module (DSNALI).

Compile Options

Enter any desired compile options. Additional options required by Program Generator will be appended to whatever is specified in this field.

DBRM Library

Enter the library for the DBRM output of the DB2 precompiler. The data set must exist and must be a PDS. If the name is enclosed in single quotes, it is taken to be a fully qualified TSO data set name. Otherwise, your current TSO profile prefix is used to qualify the name.

Perform Bind?

Enter `Y` to include a bind step in the preparation process. Enter `N` to skip the bind step.

Plan Name

Enter the name of the plan to be created by the BIND process for this program. The name entered must conform to plan and program ID naming rules.

BIND Owner Parameter

Enter the OWNER parameter to be used by the BIND process. If you leave this field blank, no OWNER will be specified for the bind, which will result in your primary authorization ID being used.

BIND Validate Parameter

Enter the VALIDATE parameter to be used by the BIND process. Enter BIND to validate SQL authorization and determine access path selection during the BIND process. Enter RUN to defer this processing until the plan is executed. You must specify RUN if this program uses static SQL that refers to nonexistent tables (for example, SAVE DATA tables).

Target Load Library

Enter the data set in which to create the load module for this program. The data set must exist and must be a PDS. If the name is enclosed in single quotes, it is taken to be a fully qualified TSO data set name. Otherwise, your current TSO profile prefix will be used to qualify the name.

Link Edit Options

Enter any desired link edit options. Additional options required by Program Generator will be appended to whatever is specified in this field.

DSNH PRINT Parameter

Enter the value to use for the DSNH PRINT parameter. This field is only used for prompted and non-prompted compiles (both of which eventually invoke DSNH).

Setting batch job parameters

Before a batch compile is invoked (or a batch run, as discussed in "Running programs" on page 49), the Batch Job Information panel is displayed to obtain more information about the job to submit. After specifying these additional batch parameters, JCL is generated and either submitted or edited.

```
DB2P ∕ DB2PLOCATION -- Batch Job Information -------------------------- 6.1.0
COMMAND ===>

Press ENTER to generate JCL.
Type CAN or CANCEL or press PF3 to cancel this run.

1. Job Cards...
     ===>
     ===>
     ===>
     ===>

2. Report DCB Parameters (for runs only)...
     SYSOUT CLASS....... ===>
     LRECL.............. ===>
     DEST............... ===>
     COPIES............. ===>

3. Write JCL To...
     Data Set........... ===>
     Member............. ===>

4. Edit or Submit JCL? ===>      (E=Edit, S=Submit)
```

If you press Enter, all input fields will be validated. If any errors are detected
during input validation, the panel will be redisplayed with an error message.
Otherwise, JCL will be generated and either edited or submitted, depending
on the value of the **Edit or Submit JCL?** flag on this panel.

If you press PF3, all input fields will be ignored and you will either return to
the previous panel or proceed with the generation process. No JCL generation
will take place.

The fields on the panel are:

Job Cards

>Enter valid job cards for the job. At least one line must be entered.
>Any lines specified will be used exactly as entered in the generated
>JCL.

If this job will run a generated program, the following four fields are enabled
and are used to specify the characteristics of the REPORTnn DDs . If this job
will compile a generated program, these fields are disabled and ignored.

SYSOUT CLASS

>Specify the SYSOUT class for the REPORTnn DDs. If you leave this
>field blank, a system default value will be used.

LRECL

>Specify the LRECL for the REPORTnn DDs. If you leave this field
>blank, 133 will be used.

DEST Specify the DEST for the REPORTnn DDs. If you leave this field

blank, a system default value will be used. If no system default value exists, the DEST parameter will be omitted.

COPIES

Specify the COPIES for the REPORTnn DDs. This number must be between 1 and 254. If you leave this field blank, the COPIES parameter will be omitted.

Data Set

Enter the data set to which the generated JCL should be written. The data set must exist. If the name is enclosed in single quotes, it is taken to be a fully qualified TSO data set name. Otherwise, your current TSO profile prefix is used to qualify the name. If it is a PDS, do not specify a member name here; use the **Member** field. You can also enter the name *TEMP to specify that a temporary data set should be created for the JCL.

Member

If the specified **Data Set** is a PDS, enter the name of the member to which the generated JCL should be written. If the `Data Set` is not a PDS or is *TEMP, this field must be left blank.

Edit or Submit JCL?

Enter E to edit the generated JCL or S to automatically submit it after it is generated.

OS/VS COBOL program requirements

If you use a method other than the Compile Programs option to prepare OS/VS COBOL programs (for example, by creating your own batch JCL), the following requirements must be observed:

Precompiler options
- APOST
- DATE(ISO)
- HOST(COBOL)
- TIME(ISO)

Bind parameters
- VALIDATE(RUN) for SAVE DATA programs
- VALIDATE(BIND) for all other types of programs

CICS translator options
- APOST

Compiler options
- APOST
- NODYNAM (only required for HPO/Runtime programs)
- NOTRUNC
- OPTIMIZE
- RESIDENT (only required for HPO/Runtime programs)

Link

For standalone programs using user-defined edit routines or any programs using the HPO call attachment module or the RAACPY option, QMFHPO.SRAALOAD must be included in the concatenation for SYSLIB.

VS COBOL II program requirements

If you use a method other than the Compile Programs option to prepare VS COBOL II programs (for example, by creating your own batch JCL), the following requirements must be observed.

Precompiler options
- APOST
- DATE(ISO)
- HOST(COB2)
- TIME(ISO)

Bind parameters
- VALIDATE(RUN) for SAVE DATA programs
- VALIDATE(BIND) for all other types of programs

CICS translator options
- APOST
- COBOL2

Compiler options
- APOST
- NODYNAM (only required for HPO/Runtime programs)
- NOTRUNC (for COBOL-II release 1 or 2)
- OPTIMIZE
- RESIDENT (only required for HPO/Runtime programs)
- TRUNC(BIN) (for COBOL-II release 3 and above)

Link

For standalone programs using user-defined edit routines or any programs using the HPO call attachment module or the RAACPY option, QMFHPO.SRAALOAD must be included in the concatenation for SYSLIB.

Running programs

After you have generated and compiled the program, you can use the Run Programs option to run it (if it is an online TSO program), or to generate JCL to run it (if it is a batch program). You can, of course, run these programs using any facilities you like.

You can also use the End User Facility to run generated programs. The method to use depends primarily on the type of user. The Run Programs option is intended for use by experienced technical users who are familiar with the concepts of programs, plans, JCL, etc. The End User Facility is intended (as the name implies) for use by non-technical end users.

Run programs options

Selecting option 4 from the Program Generator Menu brings you to the Run Programs panel . You can also invoke this panel by issuing the following TSO command:

```
CALL 'QMFHPO.SRAALOAD(RAAMAIN)' 'CO 4'
```

On this panel, you must specify basic information about the program to run. This information is used to actually run an online program, or to generate JCL to run a batch program.

```
DB2P / DB2PLOCATION -- Run Programs ------------------------------------ 6.1.0
COMMAND ===>

Press ENTER to run program.
Type CAN or CANCEL or press PF3 to bypass this run.

1. Load Library......... ===>
2. Program Name......... ===>
3. Plan Name............ ===>
4. COBOL Source Language ===>     (1=OS/VS, 2=VS-II, 370, or MVS)
5. Environment.......... ===>     (B=Batch, T=TSO)
6. DB2 Connection Type.. ===>     (C=CAF, T=TSO)

7. Additional User Load Libraries...
   Load Library 1....... ===>
   Load Library 2....... ===>

8. Additional User EXEC Libraries...
   EXEC Library 1....... ===>
   EXEC Library 2....... ===>
```

If you press Enter, all input fields will be validated. If any errors are detected during input validation, the panel will be redisplayed with an error message. Otherwise, if a TSO program was specified, it will be run. If a batch program was specified, the Batch Job Information panel will be displayed, after which the JCL to run the program will be edited or submitted. Depending on how this panel was reached, two things can happen after the run. If this panel was displayed by selecting the Run Programs option from the Program Generator Menu, it will be redisplayed after the run. If it was displayed due to a request to run a program after generation (on the Generation Options panel), the next panel in the generation process will be displayed.

If you press PF3, all input fields will be ignored and you will either return to the Program Generator Menu or proceed with the generation process. No run will take place.

If you type ABORT and press Enter, all input fields will be ignored and you will immediately return to either the Program Generator Menu or the Report List panel. No run will take place.

The fields on the panel are:

Load Library

Enter the name of the data set containing the load module to run. The data set must exist and must be a PDS. If the name is enclosed in single quotes, it is taken to be a fully qualified TSO data set name. Otherwise, your current TSO profile prefix is used to qualify the

name. This parameter is optional. If you specify a load library and not a program name, a member list for the library will be displayed from which you can select a program.

Program Name
>Enter the program to run. If you specified a load library, you can leave this field blank, in which case a member list for the library will be displayed from which you can select a program. If you specify both a load library and a program name, the program must exist in the library.

Plan Name
>Enter the name of the plan to run with this program. This field is optional. If you leave it blank, the plan name will not be specified on the run (which usually results in it defaulting to the program name).

COBOL Source Language
>Enter 1 if the program to be run is an OS/VS COBOL program or 2 if it is a VS COBOL II program. Since VS COBOL II is source compatible with AD/Cycle COBOL/370 and COBOL for MVS, you should specify 2 if you are using either of those products. This parameter is used to correctly allocate the appropriate language runtime library (OS/VS COBOL or VS COBOL II). If you leave it blank, no allocation will be performed.

Environment
>Enter B if the program to be run is a batch program or T if it is an online TSO program.

DB2 Connection Type
>Enter C if the program to be run uses the call attachment facility or T if it uses the TSO attachment facility.

Additional User Load Libraries
>Enter the names of any additional load libraries required for the run.

Additional User EXEC Libraries
>Enter the names of any additional EXEC libraries required for the run.

Run implementation

When you specify a batch program to run, this facility can either submit the JCL or allow you to edit the JCL it generates. If you specify an online TSO program, the RAARUN CLIST is invoked to run the program. This CLIST either directly invokes the program (if it uses the call attachment facility), or invokes the DSN command and issues the DSN subcommands to invoke the program.

Batch Program requirements

If you generate a program that uses the TSO attachment facility, it must be run under the DSN command processor of TSO. If you generate a program that uses the call attachment facility, you can run the program directly.

If you use a method other than the Run Programs option to run programs (for example, by creating your own batch JCL), the following requirements must be observed.

Report DDs

REPORT01 : The primary report is written to the DD named REPORT01. RECFM should be set to FBA, because the first character of each record that is written to this DD is reserved for carriage control. For standalone programs, the LRECL must equal the LRECL specified in the program. For HPO/Runtime programs, any LRECL may be specified. A typical DD declaration is:

```
⟋⟋REPORT01   DD    SYSOUT=*,
⟋⟋               DCB=(RECFM=FBA,LRECL=133,BLKSIZE=1330)
```

REPORTnn: If the report horizontally spans multiple pages, then these additional pages are written to a series of DDs named REPORT02, REPORT03, and so on. Up to 99 of these subpages are supported. A typical DD declaration is:

```
⟋⟋REPORT02   DD    SYSOUT=*,
⟋⟋               DCB=(RECFM=FBA,LRECL=133,BLKSIZE=1330)
⟋⟋REPORT03   DD    SYSOUT=*,
⟋⟋               DCB=(RECFM=FBA,LRECL=133,BLKSIZE=1330)
```

In an HPO/Runtime program, you can control the width of a report page in two ways. One way is to assign a value to the PAGE-WIDTH variable governing the page width in the generated program. For example, if you set the PAGE-WIDTH variable to 132, then no more than 132 characters **of report data** will appear on each line of the report. The phrase "of report data" is emphasized because one additional character will be included in each report row to handle carriage control. So in the previous example, even though the page width is set to 132, there will actually be 133 characters written to the report file.

Another way to control the width of a report page is to use the LRECL DCB parameter on the REPORT01 DD in your run JCL. The LRECL value sets an additional limit on the width of the report. For example, if you set LRECL=133, then at most 133 characters will appear on each record of the report file (132 characters of report data and one character of carriage control).

Both of these settings are taken into account when calculating the width of a report page and whether to split a report row across multiple pages:

```
report page width = minimum(page width variable value, LRECL - 1).
```

The LRECL is obtained from the REPORT01 DD. If you have more than one REPORTnn DD defined in your JCL, make sure that they all have the same LRECL value.

Other DDs

HOSTVARS : This DD is used to pass runtime host variable values to batch report programs. The LRECL must match the LRECL specified when the program was generated. If the program was generated to use tabular host variables, each record in this file must contain a complete set of host variable values for the program. Each value must be separated by the delimiter character specified when the program was generated. If the program was not generated to use tabular host variables, each record in this file will contain only one host variable value.

The order of values must match (in order and type) the host variables as defined in the program. Host variables are defined in alphabetical order in the program. If there is any mismatch in data types, a runtime error will cause the program to exit immediately.

This file will be read repeatedly and a report will be generated for each complete set of host variable values read. If an incomplete set of values is read, the program will terminate with an error.

A typical DD declaration (for non-tabular host variables) is:

```
⟋⟋HOSTVARS   DD    *
host variable value 1
.
.
.
host variable value n
⟋*
```

PROCVARS : Proc programs that run batch report programs that use host variables use the PROCVARS DD as described for the HOSTVARS DD above. The host variable values for each of the report programs run should be listed in the PROCVARS DD in sequence. These programs also need the HOSTVARS DD defined as a temporary file. A typical DD declaration (for non-tabular host variables) is:

```
⟋⟋PROCVARS   DD    *
program 1 host variable value 1
.
.
```

```
.
program 1 host variable value n
program 2 host variable value 1
.
.
.
program 2 host variable value n
/*
//HOSTVARS  DD    UNIT=SYSDA,SPACE=(TRK,(1,1))
```

DATAOUT : If you generate a program that writes data to a sequential file, the
DD that is opened for output is named DATAOUT. The only DCB parameter
that *must* be in sync with the program is the LRECL. The length of the output
record must exactly match the LRECL of the data set assigned to this DD. A
typical DD declaration is:

```
//DATAOUT   DD    DSN=data.set.name,DISP=disp
```

DATAIN : If you generate a program that reads data from a sequential file, the
DD that is opened for input is named DATAIN. The only DCB parameter that
must be in sync with the program is the LRECL. The length of the output
record must exactly match the LRECL of the data set assigned to this DD. A
typical DD declaration is:

```
//DATAIN    DD    DSN=data.set.name,DISP=disp
```

RAASPILL : When an HPO/Runtime program that uses a spill file runs, it uses
a DD named RAASPILL for the spill file (see 28). This DD should be defined
as a temporary file. This DD is not used by standalone programs. A typical
DD declaration is:

```
//RAASPILL  DD    UNIT=SYSDA,SPACE=(CYL,(50,50))
```

SYSEXEC : When an HPO/Runtime program that makes use of QMF's
FORM.CALC or FORM.COND features runs, it repeatedly evaluates a REXX
EXEC named RAARCXPR, which is in QMFHPO.SRAAEXEC. The DD named
SYSEXEC is searched for this EXEC at runtime, so SYSEXEC must be allocated
to QMFHPO.SRAAEXEC. A typical DD declaration is:

```
//SYSEXEC   DD    DSN=QMFHPO.SRAAEXEC,DISP=SHR
```

STEPLIB : If the program to be run is an HPO/Runtime program, your JCL
must allocate QMFHPO.SRAALOAD in JOBLIB or STEPLIB. This is not
required for standalone programs.

In addition, you may have to include the DB2 load library and sort load
library if they are not included in your site's link list. This is true of both
HPO/Runtime programs and standalone programs.

EXEC parameters

For programs using the call attachment facility, default values for the DB2 subsystem ID and the plan name are generated in the program source code. You can override these settings at runtime by passing parameters on the EXEC card. Here is an example:

```
//GO        EXEC  PGM=QUERY1,PARM='DSN,QUERY2'
```

Here is an example of how to specify only the DB2 subsystem ID and not the plan name:

```
//GO        EXEC  PGM=QUERY1,PARM='DSN'
```

TSO program requirements

If you generate a program that uses the TSO attachment facility, it must be run under the DSN command processor of TSO. If you generate a program that uses the call attachment facility, you can run the program directly from the TSO command prompt. You can also build an ISPF menu that lists each of the report programs that you generate and allows the user to select a report to run.

Allocating data sets to your ISPF session

Regardless of how the program is run, the following DDs must be allocated so that support routines, panels, and messages can be found by the program and ISPF.

STEPLIB : For HPO/Runtime programs, QMFHPO.SRAALOAD must be allocated to the STEPLIB DD.

ISPPLIB :QMFHPO.SRAAISPP must be allocated to the ISPPLIB DD. There are 5 panels in the panel library that are referenced in the generated program: RAATSO1, RAATSO2, RAATSO3, RAATSO4, and RAATSOH.

ISPMLIB :QMFHPO.SRAAISPM must be allocated to the ISPMLIB DD. There are 3 members in the message library that are referenced in the generated program: RAAB00, RAAB01, and RAAB02.

RAAPRINT : For programs that have print capability (that is, that have an associated TSO print program), RAAPRINT should be allocated before attempting to print a report. A typical DD declaration is:

```
//RAAPRINT  DD    SYSOUT=*
```

RAADATA, SYSUTn : For programs that have print capability (that is, that have an associated TSO print program), these DDs will be dynamically allocated and freed as needed. They should **not** be pre-allocated.

Passing runtime values to host variables

When you run a TSO program, you are prompted for host variable values. Each host variable in the program is displayed on an ISPF table panel along with its data type. You must specify a value for each variable on this panel.

CICS program requirements

Read through these requirements before attempting to run a generated CICS program. CICS documentation and your site's CICS administration staff are the authoritative source for information on how to set up CICS tables and startup JCL.

CICS startup job stream

QMFHPO.SRAALOAD (which contains the BMS maps used by the generated programs) must be allocated to the CICS Module Load Library list (DFHRPL). The load library that contains the programs that you generate and prepare must also be allocated.

PPT entries

All generated CICS programs interact with the user via the following three BMS maps:
- RAAMAP1 (to browse the formatted report)
- RAAMAP2 (to display formatted SQL error messages)
- RAAMAP3 (to prompt user for host variable input values)

Generated programs refer to each of these maps in a single mapset named RAAM330. This module can be found in QMFHPO.SRAALOAD.

PPTs for all of these maps must be assembled and added to the appropriate CICS regions. These PPT entries can be found in QMFHPO.SRAASAMP.

PPTs for programs that you generate and prepare must also be assembled and added to your CICS session.

PCT entries

Transaction IDs for the programs you generate must be added.

RCT entries

Resource control entries for the programs you generate must be added.

Passing runtime values to host variables

When running a CICS program, you are prompted for host variable values, one at a time, in sequence. Each host variable in the program is displayed on a CICS map along with its data type. You must specify a value for each variable.

Understanding data queue storage requirements

Generated CICS programs are completely pseudo-conversational. They terminate the task (EXEC CICS RETURN...) each time that a map is sent. Because DB2 automatically closes cursors at task termination, these programs must read all of the DB2 data before the first screen of data is displayed. In fact, the data is read from DB2, formatted according to the form specifications, and placed in auxiliary temporary storage for browsing.

This implementation has many advantages. For example, when browsing the report, you are actually browsing the data stored in temporary storage. All of the DB2 I/O has finished by the time the first screen of report data is displayed. Because the cursor is closed, all shared page locks are released by this time.

Because of this implementation, however, there is a restriction on the number of rows of report data. CICS limits the number of rows that can be written to temporary storage queues to 32767-this limits the report to 32767 lines. To enhance the performance of generated CICS programs, CICS system programmers should verify that auxiliary temporary storage is properly allocated and tuned to handle these programs.

Registering and maintaining End User Facility reports

The End User Facility provides a convenient interface through which you can run reports. Before you can run a report in this way, it must be registered with the End User Facility via the Maintain End User Facility Reports option (or via the **Register Program?** post-generation action on the Generation Options panel).

A report is defined as one of the following:
- A compiled program, most likely converted from a QMF query, query and form, or procedure
- A non-compiled QMF query, query and form, or procedure

A report is uniquely identified by the combination of owner and name, similar to how QMF objects are identified. However, if the report owner is of

the form T=**tranid** where `tranid` is a valid CICS transaction identifier, the
report is associated with that transaction rather than with a particular owner.

Report storage locations

Reports are registered in two DB2 tables. The first table, named Q.REPORTS ,
stores information about the characteristics of a report, as described above.
There is one row in Q.REPORTS for each registered report. The second table,
named Q.REPORT_VARIABLES , stores information about the runtime
variables used by each registered report. There is one row in
Q.REPORT_VARIABLES for each host variable or variable used by each report
in Q.REPORTS.

End User Facility Report Maintenance panel

All report maintenance is performed from the End User Facility Report
Maintenance panel by selecting option 5 from the Program Generator Menu.
You can also invoke this panel by issuing the following TSO command:

```
CALL 'QMFHPO.SRAALOAD(RAAMAIN)' 'CO 5'
```

```
DB2P ⁄ DB2PLOCATION -- End User Facility Report Maintenance ------------- 6.1.0
COMMAND ===>

Action.................. ===>
Report Owner............ ===>
Report Name............. ===>

Drop Confirmation? (Y⁄N) ===>




-------------------------------------------------------------------------------
Valid Actions Are...
B  Browse
C  Create
D  Drop
E  Edit
L  Display Selection List
-------------------------------------------------------------------------------
```

If you press Enter, all input fields will be validated. If any errors are detected
during input validation, the panel will be redisplayed with an error message.

If you press PF3, all input fields will be ignored and you will return to the
Program Generator Menu.

Building a selection list of reports

To build a selection list of report entries from the End User Facility Report Maintenance panel, you must enter the following fields:

Action
> Enter L (for list).

Report Owner
> Enter the report owner (up to 8 characters). The value entered must either be a valid primary or secondary SQLID or must be of the form T=**tranid**, where **tranid** is a valid CICS transaction identifier. In the latter case, reports associated with that transaction will be selected, rather than those with a particular owner. If you leave this field blank, your current SQLID will be used as a default.

Report Name
> Enter the report name (up to 18 characters). If **Action** is not C, you can use % and _ as wildcard characters in the name to process multiple reports. If you leave this field blank, % will be used as the default.

Drop Confirmation?
> Enter Y to request drop confirmations or N to suppress them. If left blank, this flag defaults to Y.

Report Selection List panel

When you enter L (for list) on the End User Facility Report Maintenance panel, the Report Selection List panel is displayed. This panel contains a list of all report entries that match the input specifications entered on the End User Facility Report Maintenance panel.

```
DB2P -- Report Selection List For QMFUSER ----------------------------- 6.1.0
COMMAND ===>                                                SCROLL ===> PAGE
1. Use S to select report.
2. Press ENTER to run selected report.
3. Press PF10 to view Report Selection List with extended information.
4. Type CAN or CANCEL or press PF3 to exit this facility.

   Report            Description
   ----------------- -------------------------------------------------------

****************************** BOTTOM OF DATA *******************************
```

If you press Enter, all rows that are selected with an action code will be
processed. After all selected rows are processed, the panel will be redisplayed.

If you press PF3, all input fields will be ignored and you will return to the
End User Facility Report Maintenance panel.

If you press PF7 or PF8, the panel will scroll backward or forward.

Browsing a report

You can a browse report entry from a selection list or directly from the End
User Facility Report Maintenance panel.

Browsing directly

To browse a report entry from the End User Facility Report Maintenance
panel, you must enter the following fields:

Action
>   Enter B (for browse).

Report Owner
>   Enter the report owner (up to 8 characters). The report owner must be
>   a valid primary or secondary SQLID or must be of the form T=**tranid**,
>   where **tranid** is a valid CICS transaction identifier. In the latter case,
>   reports associated with that transaction will be selected, rather than
>   those with a particular owner. If you leave this field blank, your
>   current SQLID will be used as a default.

Report Name

Enter the report name (up to 18 characters). You can use % and _ as wildcard characters in the name to process multiple reports. If you leave this field blank, % will be used as the default.

Browsing from a selection list

To browse a report entry from the Report Selection List panel, you must enter the following field:

Action

Enter B (for browse).

Browse Report Registration panel

The Browse Report Registration panel is a browse-only panel; you cannot change displayed attribute values from this panel.

```
DB2P ∕ DB2PLOCATION -- Browse Report Registration ---------------------- 6.1.0
COMMAND ===>
Owner..................... :
Name..................... :
Description...


-------------------------------------------------------------------------------
Shared?................... :
Program Name.............. :
Load Library.............. :
Plan Name................. :
Language.................. :
Environment............... :
DB2 Connection Type........ :
Uses Variables?........... :
Host Variable File LRECL... :
Query Name................ :
Form Name................. :
Procedure Name............ :
```

If you press Enter, you will proceed to the Browse Variables panel if this report uses any variables. Otherwise, you will proceed to the next panel or return to the previous panel if no more actions have been requested.

If you press PF3, you will proceed to the next panel or return to the previous panel if no more actions have been requested.

If you type ABORT and press Enter, you will return to the previous panel.

Browse Variables panel

The Browse Variables panel is a browse-only panel; you cannot change displayed variable definitions from this panel.

```
DB2P ∕ DB2PLOCATION -- Browse Variables For QMFUSER.REPORT -------------- 6.1.0
COMMAND ===>                                               SCROLL ===> PAGE


Variable Name                    Type
-----------------------------   ---------------


****************************** BOTTOM OF DATA ******************************
```

If you press Enter or PF3, you will proceed to the next panel or return to the previous panel if no more actions have been requested.

If you press PF7 or PF8, the panel will scroll backward or forward.

If you type ABORT and press Enter, you will return to the previous panel.

Creating a report

You can create a report from a selection list or directly from the End User Facility Report Maintenance panel.

Creating directly

To create a report entry from the End User Facility Report Maintenance panel, you must enter the following fields:

Action
> Enter C (for create).

Report Owner
> Enter the owner for this report. The owner entered must be a valid

primary or secondary SQLID or must be of the form T=**tranid**, where **tranid** is a valid CICS transaction identifier. In the latter case, the report will be associated with that transaction, rather than with a particular owner.

Report Name

Enter the name for this report. No spaces are allowed in the report name. The combination of report owner and name must be unique.

Creating from a selection list

To create a report entry from the Report Selection List panel, you must enter the following field:

Action

Enter C (for create). This action will be treated as a Create Like... The attributes of the profile entry selected with the action of C will be used as default attribute values on the Create Report Registration panel.

Create Report Registration panel

If you are creating a report from the End User Facility Report Maintenance panel, this panel will initially list default attribute values when it is first displayed. If you are creating a report from the Report Selection List panel, this panel will initially list the attribute values from the report that was selected.

```
DB2P / DB2PLOCATION -- Create Report Registration ---------------------- 6.1.0
COMMAND ===>

Owner.................. ===>
Name................... ===>
Description...
===>
-----------------------------------------------------------------------------
Shared?................ ===>
Program Name........... ===>
Load Library........... ===>
Plan Name.............. ===>
Language............... ===>
Environment............ ===>
DB2 Connection Type..... ===>
Uses Variables?........ ===>
Host Variable File LRECL ===>
Query Name............. ===>
Form Name.............. ===>
Procedure Name......... ===>
```

If you press Enter, the attribute values will be validated. If any errors are detected during input validation, the panel will be redisplayed with an error message. Otherwise, if the **Uses Variables?** field is set to `YES`, you will proceed to the Edit Variables panel. If the `Uses Variables?` field is set to `NO`, the report will be created (an entry will be inserted into Q.REPORTS), and you will proceed to the next panel or return to the previous panel if no more actions have been requested.

If you press PF3, the attribute values will be ignored and the report will not be created. You will proceed to the next panel or return to the previous panel if no more actions have been requested.

If you type `ABORT` and press Enter, the attribute values will be ignored, the report will not be created, and you will return to the previous panel.

The fields on the panel are :

Owner
Enter the owner for this report. The value entered must either be a valid primary or secondary SQLID or must be of the form T=**tranid**, where `tranid` is a valid CICS transaction identifier. In the latter case, this report will be associated with that transaction rather than with a particular owner. This field is disabled if the report is being updated.

Name Enter the name for this report. No spaces are allowed in the name. The combination of owner and name must be unique. This field is disabled if the report is being updated.

Description
Enter any 55 character description desired for this report.

Shared?
Enter YES if this report should be visible to all users or NO if it should be visible only to users with authority to SET CURRENT SQLID to the report owner.

Program Name
If this report runs a program, enter the program name. If this report runs a QMF query or procedure, this field must be left blank.

Load Library
If this report runs a program, you can optionally enter the name of the load library where the program is located. If this report runs a QMF query or procedure, this field must be left blank.

Plan Name
If this report runs a program, you can optionally enter the name of the plan to run with the program. If this report runs a QMF query or procedure, this field must be left blank.

Language

If this report runs a program, enter `COBOL` or `COBOL-II`, depending on the language in which the program is written. Since VS `COBOL II` is source compatible with AD/Cycle COBOL/370 and COBOL for MVS, you should specify COBOL-II if you are using either of those products. If this report runs a QMF query or procedure, enter `QMF`. `QMF` is not valid for QMF Version 2 installations.

Environment

Enter `BATCH`, `TSO`, or `CICS`, depending on the environment in which this report should run. If this report runs a QMF query or procedure, this field must be set to `TSO`.

DB2 Connection Type

If this report runs a program, enter `TSO`, `CAF`, or `CICS`, depending on the attachment facility used by the program. If this report runs a QMF query or procedure, this field must be left blank.

Uses Variables?

If this report runs a program that uses host variables, enter `YES`. If this report runs a QMF query or procedure that uses variables, and you want the End User Facility to prompt for variable values, enter YES. Otherwise, enter `NO`. If you enter `YES`, a subsequent panel will be displayed on which you can specify the variable names and data types.

Host Variable File LRECL

If this report runs a batch program that uses host variables, enter the LRECL to use for the HOSTVARS or PROCVARS DD at runtime. Otherwise, this field is set to 0 and is ignored.

Query Name

If this report runs a program that was generated from a query or runs a QMF query, enter the name of the query. Otherwise, this field must be left blank.

Form Name

If this report runs a program that was generated from a query and form or runs a QMF query and form, enter the name of the form. Otherwise, this field must be left blank.

Procedure Name

If this report runs a program that was generated from a procedure or runs a QMF procedure, enter the name of the procedure. Otherwise, this field must be left blank.

Edit Variables panel

When you create a new report, this panel will initially list no variable definitions. When you edit an existing report, this panel will initially list the current variable definitions for that report. You specify variable definitions by entering them on this panel.

```
DB2P ∕ DB2PLOCATION -- Edit Variables For QMFUSER.REPORT --------------- 6.1.0
COMMAND ===>                                                  SCROLL ===> PAGE

Valid Actions Are...
D  Delete
I  Insert
R  Repeat
-------------------------------------------------------------------------------
      Variable Name                     Type
      ------------------------------    ---------------

****************************** BOTTOM OF DATA ******************************
```

If you press Enter, line commands and variable definitions will be validated and processed. If any errors are detected during input validation, the panel will be redisplayed with an error message. Otherwise, if any line commands are processed, the panel will be redisplayed afterward. If there are no line commands, the variable definitions will be created (entries will be inserted into Q.REPORT_VARIABLES), and you will proceed to the next panel or return to the previous panel if no more actions have been requested.

If you press PF3, the variable definitions will be ignored and the report will not be created. You will proceed to the next panel or return to the previous panel if no more actions have been requested.

If you press PF7 or PF8, the panel will scroll backward or forward.

If you type ABORT and press Enter, the variable definitions will be ignored, the report will not be created, and you will return to the previous panel.

The fields on the panel are:

Line commands

You can use the characters `D`, `I`, and `R` as line commands to delete, insert, or repeat lines, respectively.

Variable Name

Enter the name of the variable. You should omit the colon (:) at the beginning of host variable names and the ampersand (&) at the beginning of QMF variable names.

Type   Enter the data type of the variable. Valid data types are `SMALLINT`, `INTEGER`, `DECIMAL(p,s)`, `DECIMAL(p)`, `DECIMAL`, `FLOAT`, `CHAR(n)`, `VARCHAR(n)`, `DATE`, `TIME`, and `TIMESTAMP`.

Editing a report

You can edit a report from a selection list or directly from the End User Facility Report Maintenance panel.

Editing directly

To edit a report entry from the End User Facility Report Maintenance panel, you must enter the following fields:

Action

Enter `E` (for edit).

Report Owner

Enter the report owner (up to 8 characters). The report owner must be a valid primary or secondary SQLID or must be of the form T=**tranid**, where **tranid** is a valid CICS transaction identifier. In the latter case, reports associated with that transaction will be selected, rather than those with a particular owner. If you leave this field blank, your current SQLID will be used as a default.

Report Name

Enter the report name (up to 18 characters). You can use % and _ as wildcard characters in the name to process multiple reports. If you leave this field blank, % will be used as the default.

Editing from a selection list

To edit a report entry from the Report Selection List panel, you must enter the following field:

Action

Enter `E` (for edit).

Edit Report Registration panel

You can change attribute values from the Edit Report Registration panel. However, you cannot change the key values (report owner and report name) from this panel.

```
DB2P ⁄ DB2PLOCATION -- Edit Report Registration ----------------------- 6.1.0
COMMAND ===>

Owner..................... :
Name...................... :
Description...
===>
-------------------------------------------------------------------------------
Shared?................. ===>
Program Name............ ===>
Load Library............ ===>
Plan Name............... ===>
Language................ ===>
Environment............. ===>
DB2 Connection Type..... ===>
Uses Variables?......... ===>
Host Variable File LRECL ===>
Query Name.............. ===>
Form Name............... ===>
Procedure Name.......... ===>
```

If you press Enter, the attribute values will be validated. If any errors are detected during input validation, the panel will be redisplayed with an error message. Otherwise, if the **Uses Variables?** field is set to YES, you will proceed to the Edit Variables panel. If the `Uses Variables?` field is set to NO, the report will be updated, and you will proceed to the next panel or return to the previous panel if no more actions have been requested.

If you press PF3, the attribute values will be ignored and the report will not be updated. You will proceed to the next panel or return to the previous panel if no more actions have been requested.

If you type `ABORT` and press Enter, the attribute values will be ignored, the report will not be updated, and you will return to the previous panel.

See "Create Report Registration panel" on page 63 for a description of the fields on this panel.

Dropping a report

You can drop a report from a selection list or directly from the End User
Facility Report Maintenance panel.

Dropping directly

To drop a report entry from the End User Facility Report Maintenance panel,
you must enter the following fields:

Action
> Enter D (for drop).

Report Owner
> Enter the report owner (up to 8 characters). The report owner must be
> a valid primary or secondary SQLID or must be of the form T=**tranid**,
> where `tranid` is a valid CICS transaction identifier. In the latter case,
> reports associated with that transaction will be selected, rather than
> those with a particular owner. If you leave this field blank, your
> current SQLID will be used as a default.

Report Name
> Enter the report name (up to 18 characters). You can use % and _ as
> wildcard characters in the name to process multiple reports. If you
> leave this field blank, % will be used as the default.

Dropping from a selection list

To drop a report entry from the Report Selection List panel, you must enter
the following field:

Action
> Enter D (for drop).

Report Registration Drop Confirmation panel

The name of the report to be dropped is displayed on the Report Registration
Drop Confirmation panel, along with the number of database rows that will
be deleted as a result of this drop command.

```
DB2P ∕ DB2PLOCATION -- Report Registration Drop Confirmation ------------ 6.1.0
COMMAND ===>

Press ENTER to confirm this DROP request.
Type CAN or CANCEL or press PF3 to cancel this DROP request.

Report Owner............... :
Report Name................ :

Number of rows to be deleted from Q.REPORTS........ :
Number of rows to be deleted from Q.REPORT_VARIABLES :
```

If you press Enter, the report identified on the panel will be dropped from the database. Then you will proceed to the next panel or return to the previous panel if no more actions have been requested.

If you press PF3, the drop command will be ignored (the report will remain in the database). Then you will proceed to the next panel or return to the previous panel if no more actions have been requested.

If you type ABORT and press Enter, the drop command will be ignored (the report will remain in the database), and you will return to the previous panel.

Setting default parameters

All Program Generator options use a collection of default parameter settings. These default settings are saved from session to session in your ISPF profile data set (under an application ID of RAAX). You can set these default parameters by selecting option D from the Program Generator Menu.

```
DB2P ⁄ DB2PLOCATION -- Set Default Parameters ------------------------- 6.1.0
COMMAND ===>

  1. Export Queries? (Y⁄N) ===>
     Query Data Set....... ===>
     Query Member......... ===>
  2. Export Forms? (Y⁄N).. ===>
     Form Data Set........ ===>
     Form Member.......... ===>
  3. Export Procs? (Y⁄N).. ===>
     Procedure Data Set... ===>
     Procedure Member..... ===>
     Review Proc? (B⁄E⁄N). ===>

  4. Source Code Data Set. ===>
  5. Source Code Data Set Disposition.... ===>          (OLD, SHR, or MOD)
  6. Confirm Query⁄Form Locations? (Y⁄N). ===>
  7. Confirm Exports? (Y⁄N).............. ===>

  8. QMF⁄REXX Initialization Program..... ===>
  9. Current SQLID..................... ===>
 10. QMF Profile Key (T=TSOID, P=PRIMEID) ===>
 11. Translation........................ ===>
```

If you press Enter, all input fields will be validated. If any errors are detected during input validation, the panel will be redisplayed with an error message. If there are no errors, then these default values will be saved and you will return to the Program Generator Menu.

If you press PF3, all input fields will be ignored and you will return to the Program Generator Menu. The previous default values will be restored.

The fields on the panel are:

Export Queries?
Enter Y to direct Program Generator to automatically export your queries. Enter N if your queries have already been exported.

Query Data Set
If the **Export Queries?** flag is set to N, this is the data set that already contains your queries. If the **Export Queries?** flag is set to Y, this is the data set into which your queries should be exported (in which case it must have RECFM=FB and LRECL=79). In either case, the data set must exist. If the name is enclosed in single quotes, it is taken to be a fully qualified TSO data set name. Otherwise, your current TSO profile prefix is used to qualify the name. If it is a PDS, do not specify a member name here; use the **Query Member** field. You can also enter the name *TEMP to specify that temporary data sets should be created for exporting your queries.

Query Member

If the specified **Query Data Set** is a PDS, this is the member into which your queries should be exported, or which already contains your queries. If you leave this field blank, the member name will be derived from the query name if the `Query Data Set` is a PDS. If the `Query Data Set` is not a PDS or is `*TEMP`, this field must be left blank.

Export Forms?

Enter `Y` to direct Program Generator to automatically export your forms. Enter `N` if your forms have already been exported.

Form Data Set

If the **Export Forms?** flag is set to `N`, this is the data set that already contains your forms. If the `Export Forms?` flag is set to `Y`, this is the data set into which your forms should be exported (in which case it must have RECFM=V and LRECL between 81 and 7290 for QMF V2 or between 161 and 7290 for QMF V3). In either case, the data set must exist. If the name is enclosed in single quotes, it is taken to be a fully qualified TSO data set name. Otherwise, your current TSO profile prefix is used to qualify the name. If it is a PDS, do not specify a member name here; use the `Form Member` field. You can also enter the name `*TEMP` to specify that temporary data sets should be created for exporting your forms.

Form Member

If the specified **Form Data Set** is a PDS, this is the member into which your forms should be exported, or which already contains your forms. If you leave this field blank, the member name will be derived from the form name if the `Form Data Set` is a PDS. If the `Form Data Set` is not a PDS or is `*TEMP`, this field must be left blank.

Export Procs?

Enter `Y` to direct Program Generator to automatically export your procedures. Enter `N` if your procedures have already been exported.

Procedure Data Set

If the **Export Procs?** flag is set to `N`, this is the data set that already contains your procedures. If the `Export Procs?` flag is set to `Y`, this is the data set into which your procedures should be exported (in which case it must have RECFM=FB and LRECL=79). In either case, the data set must exist. If the name is enclosed in single quotes, it is taken to be a fully qualified TSO data set name. Otherwise, your current TSO profile prefix is used to qualify the name. If it is a PDS, do not specify a member name here; use the `Procedure Member` field. You can also enter the name *TEMP to specify that temporary data sets should be created for exporting your procedures.

Procedure Member

If the specified **Procedure Data Set** is a PDS, this is the member into

which your procedures should be exported, or which already contains your procedures. If you leave this field blank, the member name will be derived from the procedure name if the **Procedure Data Set** is a PDS. If the **Procedure Data Set** is not a PDS or is *TEMP, this field must be left blank.

Review Proc?

Enter B to browse input procedures before generation, E to edit them, or N to do neither.

Source Code Data Set

Enter the data set to which generated programs should be written. The data set must exist. If the name is enclosed in single quotes, it is taken to be a fully qualified TSO data set name. Otherwise, your current TSO profile prefix is used to qualify the name.

Source Code Data Set Disposition

Enter the disposition for the source code data set on output. Valid values are OLD, SHR, or MOD.

Confirm Query/Form Locations?

If you enter Y, the Confirm Query/Form Locations panel will be displayed during the generation process, on which you can confirm the location of every query and form used as input. If you enter N, default values will be used to determine the location of each query and form.

Confirm Exports?

If you enter Y, the Export Confirmation panel will be displayed during the generation process on which you can confirm each QMF export command before it is issued. Entering N will cause exports to proceed without confirmation.

QMF/REXX Initialization Program

If your site uses a REXX program other than the default (DSQSCMDE) to set default QMF start-up parameters, enter its name here.

Current SQLID

Enter a 1-to-8 character SQLID to be used to qualify query, form, procedure, and table names. The value entered must be a valid primary or secondary SQLID. If this value is left blank, your current SQLID will be used to qualify object names.

QMF Profile Key

QMF Version 3 and later provides the ability to select your profile based either on your TSO logon ID or your primary SQLID. If this flag is set to T, your TSO ID is used. If it is set to P, your primary SQLID is used. This flag is not used for QMF Version 2.

Translation

Enter the QMF translation value that should be used to select your profile. Valid values are ENGLISH, UPPERCASE, FRANCAIS CANADIEN, SIMPLIFIED CHINESE, T-CHINESE, DANSK, FRANCAIS, DEUTSCH, ITALIANO, NIHONGO, HANGEUL, PORTUGUES, ESPANOL, SVENSKA, FRANCAIS (SUISSE), and DEUTSCH (SCHWEIZ). If you leave this field blank or enter an asterisk (*), the system default will be used.

Modifying HPO/Runtime programs

In some cases, it is necessary or desirable to make changes to source code after it is generated. Functions that are not supported by QMF or that can be done more efficiently in the source language than in QMF can easily be added to programs. To do this, you must understand the generated programs' control flow and variable definitions.

Note: This chapter discusses only the modification of HPO/Runtime programs. It does not apply to standalone programs (although some parts of it may be relevant to standalone programs as well).

Enhancing the generated program

You can make changes to the generated source code to add functions not supported by QMF and to replace functions that are inefficient in QMF. You can also make changes to the generated source code to modify the format of a report (without having to re-generate from QMF).

Some of these changes include:

- Additional filtering of input data
- Moving computations from SQL to the source language
- Replacing sequential I/O with VSAM I/O
- Obtaining host variable values from VSAM files
- Modifying data from DB2 and data aggregations
- Removing columns from the SELECT clause

Examples follow that demonstrate making some of these changes to an HPO/Runtime OS/VS COBOL program that selects all of the columns from the Q.STAFF table:

- Column 1: ID
- Column 2: NAME
- Column 3: DEPT
- Column 4: JOB

- Column 5: YEARS
- Column 6: SALARY
- Column 7: COMM

Additional filtering of input data

After the data is fetched from DB2, read from DATAIN, or returned from the SORT-FILE, you have access to the entire row, including the null indicators. You can perform additional filtering, and if desired, discard the row. For example, you might want to ignore all rows where the value of DEPT is 30 (even though the SQL WHERE clause says where DEPT > 10). To do this, add the following to 3101-FILTER:

```
IF COL003 = 30
   MOVE WS-FALSE TO FILTER-PASSED.
```

Then, uncomment this paragraph and the perform of this paragraph. No other changes need to be made.

Moving computations from SQL to the source language

Some SQL programmers compute values in a query's SELECT clause, for example:

```
SELECT (SALARY ∕ 12)
```

Because computations in SQL are inefficient, you can change the query to SELECT SALARY and then modify the value of SALARY in the program source code:

```
COMPUTE COL006 = COL006 ∕ 12.
```

Simply add this code after the row is fetched, read, or returned.

Replacing sequential I/O with VSAM I/O

Reading from a VSAM file: First, generate a program that reads data from DATAIN. Then modify all code that defines, opens, reads, and closes DATAIN to perform the VSAM equivalent.

Writing to a VSAM file: First, generate a program that writes to DATAOUT only. Then, modify all code that defines, opens, writes, and closes DATAOUT to perform the VSAM equivalent.

Obtaining host variable values from VSAM files

When you generate a batch program from a query with host variables, the appropriate routines to read values from a sequential file are included. If you

need to read these values from a VSAM file instead, simply change all code that defines, opens, reads, and closes HOSTVARS to perform the VSAM equivalent.

Modifying data from DB2 and data aggregations

Because you have access to all of the data obtained from DB2, you can make changes before aggregates are computed and the data is formatted for printing. You can also keep your own aggregates (in addition to the ones that will appear on the printed report). For example, after data is fetched from the DB2 table, add this code to keep a running sum of SALARY:

```
IF INDICATORS (6) > -1
    ADD COL006 TO SALARY-SUM.
```

Removing columns from the SELECT clause

To add or remove a column from the query's SELECT clause, a number of interdependent changes must be made. To add a column, corresponding changes need to be made in all of the same places.

In SECTION 3 of working storage, remove the column from the C1 cursor.

In SECTION 4 of working storage:
- Remove the column from FETCH-STRUCTURE.
- Remove the column from INDICATORS.
- Adjust the OCCURS clause of INDICATORS-A.
- Adjust the PIC X length of FETCH-STRUCTURE-BLOCK (new length = old length - column length).
- Adjust the PIC X length of INDICATORS-BLOCK (subtract 2 for each column removed).

In SECTION 5 of working storage:
- Adjust the FORM-NUM-COLUMNS variable.
- Remove the FCnnn block of variable definitions.
- Adjust other FCnnn-NUMBERs to reflect the new column order.

Modifying variable definitions

You can alter many program functions simply by modifying variable values, without making any procedural source code changes. For example, if your program currently does not have any fixed columns and you want to change it to handle two fixed columns, simply change the value of the variable named FO-NUM-FIXED-COLUMNS from +0 to +2. Once recompiled, the program will treat the first two columns as fixed. This is just one function that can be altered without changing any procedural source code.

A representation of the form is included in the variable definition area of the program. You can change the values of form variables (just as you would change the form under QMF) to reformat the report data. Most changes, such as setting the number of fixed columns, are simple and require no related changes. Other examples include:

- Changing the alignment of a text line
- Changing the usage code or edit code of a form column
- Changing the option to include the function name in a column heading when grouping

Some changes, such as adding or removing a break level, require other related changes to maintain consistency. For example, one of the form variables retains a value for the number of break levels. There is also a form structure (03 level in OS/VS COBOL) that contains a set of variables for each break level. If you set the number of break levels to three, then you must have exactly three sets of break variables under the form structure for break data. An example for OS/VS COBOL follows:

```
01  THE-FORM.
    03  FORM-NUM-BREAKS     PIC S9(4) COMP VALUE +1.
    .
    .
    .
01  FB-FORMAT.
    03  FB1.
        05  ...
        05  ...
```

Other examples that require additional consistent changes include:

- Adding or removing form variables to text lines
- Adding or removing text lines
- Adding or removing columns from the SELECT clause

General program structure

Both the batch and TSO environments are supported for programs that use the HPO/Runtime option. TSO programs include ISPF dialog manager service calls to display panels, define variables, and so on. Batch programs do not contain any such calls.

A batch program and a TSO program generated from the same query and form will be similar in structure. In fact, some portions of the code will be identical. However, there will be other significant differences between these two types of programs. Because of this, a description of each type of program follows this section. After that, a discussion of how these programs change depending on the other generation options chosen is presented.

All programs except those that use host variables follow this basic structure. (Programs using host variables are discussed in "COBOL batch program with host variables" on page 86".)

```
INITIALIZE;
PROCESS MAIN LOOP;
CLEAN UP;
EXIT.
```

The INITIALIZE section handles all initialization that is not performed at compile time (such as the VALUE clause). Examples of functions handled in this section include connecting to DB2, opening the cursor, and creating a table for the SAVE DATA function.

The PROCESS MAIN LOOP section processes the data and prints or displays the report. Data can be read from DB2, a sequential file, or any other source that you code for. Once read, data is passed to the runtime modules to be formatted. After all the data is processed, or if a severe error occurs, this loop is terminated.

All cleanup functions, such as closing the cursor and disconnecting from DB2, are processed in the CLEAN UP section.

In the EXIT section, a return code is set which reflects the success or failure of the program. If the program is using the call attachment facility to attach to DB2, this return code will be the true job step condition code. If the program is using the TSO attachment facility, this return code will not be reflected in the job step condition code (the return code of the DSN command processor will be shown, which will usually be 0).

COBOL batch program

This section describes a basic COBOL batch program: one for a SELECT query, without host variables, without internal sorting, and without SAVE DATA processing.

Main Process: The main process performs three paragraphs before the GOBACK statement:

```
1000-INITIALIZE;
3000-FETCH-BLOCK;
4000-CLEAN-UP.
```

Before exiting, RETURN-CODE is set to:

+0   to indicate that the program completed without error or warnings

+4   to indicate that the program completed with warnings

+12   to indicate that the program completed with errors

1000-**INITIALIZE:**This paragraph controls the various initialization functions:

```
1400-INIT-CAF;
1700-INIT-RUNTIME;
1800-OPEN-CURSOR;
1900-INIT-MISC.
```

1400-**INIT**-**CAF:**

Note: This routine will only be included in generated programs that use the call attachment facility. For programs which use the TSO attachment facility, the connection to DB2 and the opening of the application plan are handled by the DSN command processor.

The connection to DB2 and the opening of the application plan are performed in this paragraph via calls to the HPO call attachment module (named AACAF). The program communicates with AACAF via a parameter area named CAF-AREA. (For a detailed discussion of this communication, see "Appendix C. Interface to the HPO call attachment module" on page 315.) The DB2 subsystem and the application plan name must be specified in this parameter area. They are given initial values at compile time, but you can override these values at runtime by using the PARM field on the JCL EXEC statement. See "Batch Program requirements" on page 52 for details of how to do this.

1700-**INIT**-**RUNTIME:**An initial call is made to the HPO runtime modules. The name of the primary interface runtime module (which is contained in the COBOL variable RUNTIME-PGM) is RAAREXEC. Basic addressability is established at this time. Also, the form variables are checked for consistency and validity.

1800-**OPEN**-**CURSOR:**If the data for this report is to be obtained from a DB2 query, the C1 cursor is opened at this time. If the SQLCODE is not zero, then the OPEN-CURSOR flag remains set at FALSE and an error condition is indicated.

If the data is to be obtained from a sequential file, then DATAIN is opened for input. In this case, there are no references at all to C1 or any other cursor.

1900-**INIT**-**MISC:**Variables that were not initialized at compile time are set in this paragraph.

3000-**FETCH**-**BLOCK:**This paragraph is performed until all of the data is processed or until an error condition is detected. The general flow of this module is to fetch data from the input source (either DB2 or a sequential file) and add the data to the fetch block. When the fetch block is full, pass the

buffer on to the runtime modules for formatting and printing. Repeat this process until all of the data is read and processed. The subordinate paragraphs performed in this loop are:

```
3010-O-FETCH-ROW;
3400-PROCESS-BLOCK.
```

3010-O-FETCH-ROW:A data row is obtained from the input source, either a FETCH from DB2 or a READ from DATAIN. If an error is detected, the error routine is performed. If the end of the input has not been reached, then a call is made to 3300-PROCESS-ROW.

A block of comments in this paragraph references a paragraph named 3011-FILTER. This paragraph is included in the program but is also commented. Additional filtering of input data can be accomplished by uncommenting this code and adding new predicate logic to appropriately set the variable FILTER-PASSED.

If the end of the input source is reached, a call is made to 4100-CLOSE-CURSOR to close the input source.

3300-PROCESS-ROW: Each fetched row that passes any additional filtering is added to the fetch block.

3400-PROCESS-BLOCK: Once the fetch block is full, a call is made to the runtime modules. This call passes the number of rows in the fetch block and the fetch block itself. The runtime modules process the data and return to this paragraph.

4000-CLEAN-UP: This paragraph controls the various cleanup functions:

```
4100-CLOSE-CURSOR;
4300-CLOSE-RUNTIME;
4500-CLOSE-CAF.
```

4100-CLOSE-CURSOR: If it has not already been closed, the C1 cursor is closed at this point. If the input was obtained from a sequential file, then DATAIN is closed instead.

4300-CLOSE-RUNTIME: One final call is made to the runtime modules to free allocated storage.

4500-CLOSE-CAF:

Note: This routine will only be included in the generated programs which use the call attachment facility.

A call is made to AACAF to terminate the connection to DB2. This implicitly closes the application plan.

Working Storage - Section 1: Input Variables: You can change the values assigned to these variables before you compile the generated program. Do not change the variable types, lengths, or names.

Page dimensions are obtained from your QMF profile (or the SYSTEM profile if open enrollment is used). If input to the generation process was a procedure with a PRINT REPORT command, any values specified for the WIDTH and LENGTH parameters on that command will override the profile values.

If this program uses the call attachment facility, it will use the values for SSID and PLAN which are included here by default. You can override these settings at runtime by passing parameters on the EXEC card (refer to the program's LINKAGE SECTION). As an example:

```
//GO        EXEC  PGM=QUERY1,PARM='DSN,QUERY1'
```

Working Storage - Section 2: Processing Variables: These variables are used to keep track of various states and for working variables. As a rule, you should not change any of these variable names or values.

Working Storage - Section 3: Host Variables, Cursor, and SQLCA: Any host variables will be declared and defined before the cursor.

A cursor named C1 is declared here. This cursor consists of the SQL statement (query) that was selected during the generation process. All variables have been replaced by the values that were set during the generation process.

The SELECT clause should not be changed in any way because the column order, number, and types are tied directly to the form variables and the fetch structure. Any changes made to the SELECT clause must be accompanied by corresponding changes in other parts of the program.

Working Storage - Section 4: The Fetch Structure and Indicators: An 03-level named FETCH-STRUCTURE is included in the program's working-storage. This structure's 05-levels correspond directly (in order, number, and type) to each of the columns in the query's SELECT clause. CHAR, VARCHAR, TIME, DATE, and TIMESTAMP fields include 49-levels for length and text. An array of half-words (named INDICATORS) is included after the fetch structure. These indicators are set by DB2 to signal any NULL column values after each row is fetched. The number of array element occurrences will always be equal to the number of columns found in the SELECT clause of the query.

Both the fetch structure and the null indicators are defined within an 01-level variable named DATA-RECORD:

```
01  DATA-RECORD.
    03  FETCH-STRUCTURE
        .
        05  col-name      PIC picture.
        .
    03  INDICATORS.
        05  INDICATORS-A PIC S9(4) COMP
                         OCCURS n TIMES.
```

The names of these variables are the names of the columns selected in the
query's SELECT clause. You can change the name of a fetch structure variable.
Do not change the variable type or length.

The fetch block is also included in this section. To change the number of rows
to be included in each block, you must change the variable named
FB-INDEX-MAX and the OCCURS clause of the FETCH-STRUCTURE-BLOCK
and the INDICATORS-BLOCK array definitions.

Working Storage - **Section 5: The Form:**This section contains ten 01-level
variables. The first four consist of constants that can be used to interpret and
understand the settings in the next six 01-level variables. These first four
variable groups are:

```
01  USAGE-CODES.
01  EDIT-CODES.
01  DATA-TYPES.
01  MISCELLANEOUS-FORM-CONSTANTS.
```

The next six 01-levels represent the form data:

```
01  THE-FORM.
01  FC-FORMAT.
01  FB-FORMAT.
01  FCALC-FORMAT.
01  TL-FORMAT.
01  VAR-FORMAT.
```

Values are assigned according to the form selected in the generation process.
The order of the variables underneath each 01-level must not be altered. Do
not change any of these variable names, types, or lengths. However, you can
change most variable values to alter the format of the report. Some changes to
variable values must be accompanied by corresponding changes elsewhere to
maintain consistency.

COBOL batch program replacing ORDER BY with sorting

When generating a program, this facility can replace the query's ORDER BY
clause with a COBOL internal sort. The ORDER BY clause is included in the
declaration of the cursor, but it is commented out.

Note: In many instances, using a COBOL internal sort will result in significant CPU savings. However, in some cases, DB2 makes use of clustered indexes and does not need to sort to satisfy an ORDER BY clause. So, use caution when generating programs of this type.

The discussion that follows highlights the differences between a program with a sort and a program without a sort. An explanation of the modules that are the same in both types of programs will not be repeated.

Main Process: The main process when using a COBOL internal sort includes the following steps:

```
1000-INITIALIZE;
SORT SORT-FILE
   ON asc⁄desc KEY sort data
   ON asc⁄desc KEY sort data
   ...
   INPUT PROCEDURE SORT-INPUT
   OUTPUT PROCEDURE SORT-OUTPUT;
4000-CLEAN-UP.
```

A SORT statement replaces 3000-FETCH-BLOCK. A file named SORT-FILE is used with the appropriate SELECT statement and FD clause included at the beginning of the program. Also, the columns referenced in the FD clause exactly match in type, length, and number the columns in the DATA-RECORD (fetch structure and indicators). The only difference is that the column names are prefixed with SD-.

SORT-INPUT SECTION: This section reads all of the input data (by performing 3010-I-FETCH-ROW) and releases it to the sort routine.

3010-I-FETCH-ROW: This section simply obtains input data from the input source and releases it to the sort file. Again, the commented perform of 3011-FILTER for additional filtering is included. When the end of the input source is reached, it is closed by performing 4100-CLOSE-CURSOR.

SORT-OUTPUT SECTION: This section returns records from the sort file and then processes them (by performing 3000-FETCH-BLOCK) for the formatted report.

PROCESS SECTION: The rest of the code appears in this section.

3010-O-FETCH-ROW: This paragraph now obtains its input by returning rows from the sort file.

COBOL batch program with SAVE DATA

You can generate a program that writes fetched data to a DB2 table, mimicking the function of the QMF SAVE DATA command. Batch programs that save data are the same whether or not an internal sort is being performed.

The discussion that follows highlights the differences between a program with SAVE DATA processing and a program without SAVE DATA processing. An explanation of the modules that are the same in both types of programs is not repeated.

1000-INITIALIZE:A call to 1500-INIT-SAVE-DATA is included in this paragraph.

1500-INIT-SAVE-DATA: This paragraph performs two functions. First, the table to which data is to be saved (known as the target table) is checked for existence. This is done by dynamically preparing a simple SELECT query that reads from the target table.

If the prepare is successful (meaning the target table exists), then the target table columns are compared in number, type, and length to the columns referenced in this program's cursor (1510-CHECK-TARGET). If the formats match exactly, then all of the data in the target table is deleted (1520-CLEAR-TARGET). If the table formats do not match, then an error condition is indicated and processing stops.

If the prepare is not successful, then the program checks to see if the failure was due to the fact that the table does not exist. If it does not exist, then this program creates the table (1530-CREATE-TARGET). If the prepare fails for any other reason, then an error condition is indicated and processing stops.

3010-I-FETCH-ROW and 3010-O-FETCH-ROW: If this program involves sorting, then 3100-INSERT is performed from 3010-I-FETCH-ROW. If this program does not involve sorting, then 3100-INSERT is performed from 3010-O-FETCH-ROW.

3100-INSERT: Data read from the input source is inserted into the target table, one row at a time.

COBOL batch program writing to DATAOUT

Programs can optionally write data to a DD named DATAOUT. In fact, the same program can SAVE DATA to a DB2 table as well as write data to DATAOUT. There are many instances where writing data to a sequential file is

more efficient than saving data to a DB2 table (due to the overhead associated with checking column compatibility, deleting data, creating a table, or inserting into a table).

Again, not many changes in the program structure are required to support writing to DATAOUT.

1000-INITIALIZE: This paragraph makes a call to 1600-OPEN-DATAOUT to open the file for output.

3010-I-FETCH-ROW and 3010-O-FETCH-ROW: If this program involves sorting, then 3200-WRITE is performed from 3010-I-FETCH-ROW. If this program does not involve sorting, then 3200-WRITE is performed from 3010-O-FETCH-ROW.

3200-WRITE: Data read from the input source is written to the DATAOUT DD, one row at a time.

4000-CLEAN-UP: This paragraph makes a call to 4400-CLOSE-DATAOUT to close the file.

COBOL batch program reading from DATAIN

Programs can optionally obtain or read input data from a sequential file named DATAIN (as opposed to fetching from DB2). You can actually have this program read from any source of data, as long as the input data format matches the fetch structure and indicators.

1800-OPEN-CURSOR:DATAIN is opened for input.

3010-I-FETCH-ROW and 3010-O-FETCH-ROW: If this program involves sorting, then 3010-O-FETCH-ROW reads data from DATAIN. If this program does not involve sorting, then 3010-O-FETCH-ROW reads data from DATAIN.

Because this program does not involve a cursor, no filtering is done on the input data (as would happen with an SQL WHERE clause). To add filtering, uncomment the appropriate lines of code in this module that perform 3011-FILTER.

3011-FILTER: Add your own code to this paragraph to filter the input data. For example, if you want to read a sequential file and omit rows where ID is greater than 100, add the following to this paragraph:

```
IF ID > 100
   MOVE WS-FALSE TO FILTER-PASSED.
```

The paragraph that performed 3011-FILTER bypasses rows for which FILTER-PASSED is set to WS-FALSE (+0).

4100-CLOSE-CURSOR:DATAIN is closed.

COBOL batch program running non-SELECT SQL

You can generate programs from QMF queries that contain non-SELECT SQL. These programs basically contain the code to connect to DB2, obtain host variable input, and execute the SQL.

Main Process: The main process performs paragraph 2000-EXECUTE-SQL (instead of processing a fetch loop).

1000-INITIALIZE: The call to 1700-INIT-RUNTIME is not included, as no report is generated by this type of program.

2000-EXECUTE-SQL: The non-SELECT SQL is executed in this paragraph. If any errors are encountered, then a rollback is performed and the return code is set to +12. If any warnings are encountered, the return-code is set to +4.

COBOL batch program with host variables

The structure of programs that use host variables is significantly different from other programs. These programs read host variable values from the DD named HOSTVARS and then perform whatever other processing is specified.

Main Process: The main process in a program that uses host variables includes the following steps:

```
H100-INIT-BATCH-HOST-VARS;
H200-BATCH-HOST-VAR-DRIVER;
H300-CLEAN-UP-BATCH-HOST-VARS.
```

The processing associated with a program that does not use host variables is contained in the H200-BATCH-HOST-VAR-DRIVER paragraph. This code is executed repeatedly, using different sets of host variable values read from the HOSTVARS DD. This process is continued until end-of-file is reached.

H100-INIT-BATCH-HOST-VARS: This paragraph performs initialization that can be performed once for the entire set of reports to be run. The HOSTVARS DD is also opened at this time.

```
1400-INIT-CAF;
1700-INIT-RUNTIME.
```

H200-BATCH-HOST-VAR-DRIVER: This paragraph controls the processing for each set of host variables read and each report generated. It includes performs of three paragraphs:

```
H210-READ-HOST-VAR-SET;
H220-REINITIALIZE;
H230-PROCESS-ONE-REPORT.
```

H210-**READ**-**HOST**-**VAR**-**SET:**This paragraph reads one set of host variables by performing 1300-INIT-HOST-VARS. It also writes status messages indicating the progress of the program.

H220-**REINITIALIZE:**For the second and subsequent host variable sets, the program's internal state is reset in this paragraph. A call to the runtime modules is also made to reset their internal state.

H230-**PROCESS**-**ONE**-**REPORT:**This paragraph contains the code that would have comprised the Main Process for this program if it did not use host variables.

1300-**INIT**-**HOST**-**VARS:**This paragraph performs 1330-SET-HOST-VARS to read and set all host variable values. If any errors are encountered due to invalid or incomplete data, 9900-HANDLE-ERRORS is performed.

1330-**SET**-**HOST**-**VARS:**The DD named HOSTVARS is opened for input. Data is read from this data set to supply runtime values to host variables.

This paragraph performs 1331-READ-NEXT-HV to read the next record (host variable value) from HOSTVARS. 1331-READ-NEXT-HV is performed once for each host variable that is defined in the program's Working Storage Section 3. After a successful read, the variable named HV-VALUE contains the host-variable in character format.

If the host variable is of type CHAR, DATE, TIME, or TIMESTAMP, HV-VALUE is moved directly to the host variable.

If the host variable is of type INTEGER or SMALLINT, HV-VALUE must be converted to a numeric format. This is done by performing 1333-SET-FULL, which converts the character format in HV-VALUE to packed decimal format in HV-FULL. Then, HV-FULL is moved directly to the host variable.

If the host variable is of type DECIMAL or FLOAT, HV-VALUE must be converted to a numeric format. This is done by performing 1335-SET-DOUBLE, which converts the character format in HV-VALUE to double word format in HV-DOUBLE. Then, HV-DOUBLE is moved directly to the host variable.

If the host variable is of type VARCHAR, HV-VALUE must be converted to VARCHAR format. This is done by performing 1337-SET-VARCHAR, which

converts the character format in HV-VALUE to varchar format in
HV-VARCHAR. Then, HV-VARCHAR is moved directly to the host variable.

After all rows are read, HOSTVARS is closed.

1331-**READ**-**NEXT**-**HV:**The next row is read from HOSTVARS. HV-COUNT is
incremented by 1 if the row is read successfully. Each time that
1330-SET-HOST-VARS performs this paragraph, it expects a new host variable
value to be read from HOSTVARS. Therefore, an error is indicated if
end-of-file is reached.

1333-**SET**-**FULL** and **1334**-**GET**-**FULL:**These two paragraphs convert
HV-VALUE, which is in character format, to HV-FULL, which is in packed
decimal format.

1335-**SET**-**DOUBLE** and **1336**-**GET**-**DOUBLE:**These two paragraphs convert
HV-VALUE, which is in character format, to HV-DOUBLE, which is in double
word format.

1337-**SET**-**VARCHAR** and **1338**-**DECREMENT**-**VARCHAR**-**LEN:**These two
paragraphs convert HV-VALUE, which is in character format, to
HV-VARCHAR, which is in varchar format.

Modifying standalone programs

In some cases, it is necessary or desirable to make changes to source code
after it is generated. Functions that are not supported by QMF or that can be
done more efficiently in the source language than in QMF can easily be added
to programs. These standalone programs are simple OS/VS COBOL or VS
COBOL II programs without any runtime dependencies. The entire report
process is contained in the generated source code, so you can make any
change to the report by modifying the source code.

Chapter 3. End User Facility

The End User Facility provides a convenient interface through which you can run reports.

A report is defined as one of two things:

- A compiled program, most likely converted from a QMF query, query and form, or procedure
- A non-compiled QMF query, query and form, or procedure

Before you can run a report, it must be registered with the End User Facility through Program Generator. You can run reports by selecting them from a list. If the report uses input variables, a subsequent panel will be displayed, on which you can specify runtime values for them.

There are two versions of the End User Facility: one for TSO and one for CICS. These two versions are very similar in appearance and behavior. In either environment, if it is an online report, it is automatically run online, and the report is displayed to the user. In either environment, the user can choose to print the report. Under TSO, if the selected report is a batch program, JCL to run it is automatically generated and submitted (or edited if desired). Under TSO, non-compiled QMF queries, queries and forms, and procedures can be run online.

This chapter tells you how to access the End User Facility, and how to use it to select report programs, provide variable values to those programs, and run those programs.

Starting the End User Facility from TSO

You can access the End User Facility by selecting option 2 from the Compiler Selection Menu, or by issuing the following TSO command:

```
CALL 'QMFHPO.SRAALOAD(RAAMAIN)' 'EU'
```

When you invoke the End User Facility from TSO, you can pass a parameter that is used to set the current report owner. This eliminates the need to use the Set Default Parameters panel to set this value. Here is an example of how to invoke the End User Facility and set the current report owner to USER1 :

```
CALL 'QMFHPO.SRAALOAD(RAAMAIN)' 'EU (OWNER=USER1'
```

This is the End User Facility Selection Menu . It is displayed only from the TSO version of the End User Facility.

```
QMF HPO/Compiler -- End User Facility Selection Menu ------------------- 6.1.0
ENTER SELECTION ===>

                                    DB2 ID   ===> DB2P

                                    User ID:
                                    Date
                                    Time:
---------------------------------------------------------------------
1  Run Reports From Lis
D  Set Default Parameter
Q  QM
X  Exi
```

Starting the End User Facility from CICS

You can start the End User Facility from CICS by using the transaction
identifier assigned during installation . The default value for this identifier is
RAAE , however there is no requirement to use this default name.

Running reports from a list

The Report Selection List panel can be displayed either with or without
extended information. The first time that you use the End User Facility, the
Report Selection List panel is displayed without extended information. To
switch between the two versions of the panel, press PF10 or enter the
SWAPVIEW command. Whichever version of the panel was displayed when
you last exited the End User Facility is displayed the next time you enter the
facility.

Invoking the Report Selection List panel from TSO

Under ISPF, you can display the Report Selection List panel by selecting
option 1 from the End User Facility Selection Menu, or by issuing either of
these TSO commands:

```
CALL 'QMFHPO.SRAALOAD(RAAMAIN)' 'EU 1'
CALL 'QMFHPO.SRAALOAD(RAAMAIN)' 'EU L'
```

If you enter the second of these commands, the End User Facility Selection
Menu will not be displayed when you leave the Report Selection List. Instead,
you will exit the End User Facility.

LIST REPORTS from QMF

You can also invoke the Report Selection List panel directly from a QMF
session by issuing the QMF command synonym LIST REPORTS. You can pass

the owner parameter with this command. See "Step 2a. Create Compiler command synonyms" on page 231 for information about how to enable the LIST REPORTS command synonym.

```
LIST REPORTS
LIST REPORTS (OWNER=USER1
```

Invoking the Report Selection List panel from CICS

Under CICS, running the End User Facility transaction brings you to the Report Selection List panel.

Using the Report Selection List panel

This is the Report Selection List panel without extended information. It is available under both TSO and CICS.

```
 DB2P -- Report Selection List For QMFUSER ------------------------------- 6.1.0
 COMMAND ===>                                      SCROLL ===> PAGE


 1. Use S to select report
 2. Press ENTER to run selected report
 3. Press PF10 to view Report Selection List with extended information
 4. Type CAN or CANCEL or press PF3 to exit this facility


 Report          Descriptio
 ----------------------------------------------------------------------

 *************************** BOTTOM OF DATA*********************************
```

This is the Report Selection List panel with extended information. It is available only under TSO.

```
DB2P -- Report Selection List For QMFUSER ------------------------------ 6.1.0
COMMAND ===>                                                SCROLL ===> PAGE
1. Use S to select report.
2. Press ENTER to run selected report
3. Press PF10 to view Report Selection List without extended information
4. Type CAN or CANCEL or press PF3 to exit this facility


   Report            Mode   Compiled? Description

   ----------------- ------ --------- ----------------------------


 ---------------------------------------------------------------
***************************** BOTTOM OF DATA ******************************
```

The following keys and commands are available from both forms of the
Report Selection List panels:

If you press Enter, the first row selected with S will be processed. If a row is
selected with a code other than S, the panel will be redisplayed with an error
message. After the first selected row is processed, the panel will be
redisplayed. Under TSO, you can also select a row with E (to edit generated
batch JCL).

Under TSO, if you press PF3, all input fields will be ignored and you will
return to the End User Facility Selection Menu. Under CICS, if you press PF3
or CLEAR, all input fields will be ignored and you will exit the transaction.

If you enter SELECT <name> on the command line, where <name> is the name
of a report in the list, that report will be selected. You can use any
abbreviation of the word SELECT, for example, S <name>.

If you enter LOCATE <name> on the command line, the displayed list will be
repositioned to the report named <name>. You can use any abbreviation of the
word LOCATE, for example, L <name>.

Under TSO, if you enter EDIT <name> on the command line, where <name> is
the name of a batch report in the list, the JCL for that report will be generated
and edited. You can use any abbreviation of the word EDIT, for example, E
<name>. This command cannot be used on a non-batch report.

Under TSO, if you press PF10 or enter SV or SWAPVIEW on the command line,
you will toggle between displaying and not displaying extended information.

Selecting a report

To select a report, position the cursor to the left of the report name. When the cursor is positioned, enter the letter S to select the report. If the report requires variable input, a panel on which to enter input variable values will be displayed. If the report is an online program, then it will be run automatically and the report will be displayed. If the report is a batch program, then the JCL will be generated and submitted automatically. Under TSO, you can also enter the letter E to select a batch report. This allows you to edit the JCL after it is generated.

What reports show up in the selection list under TSO

Three attributes are assigned when a TSO report is created that determine whether it will show up in a user's selection lists:

- Environment
- Shared Status
- Report Owner

Environment defines the environment in which the report can run. Only TSO programs and batch programs show up in selection lists when using the End User Facility under TSO.

Shared Status defines the authorization level of the report. Shared reports are available to all users. If a report is defined as restricted, then use of the report is limited to authorized users.

The third attribute is Report Owner. Users are authorized to use a given report (regardless of its Shared Status) if they can set their CURRENT SQLID to the owner of the report.

Therefore, if the current report owner (CURRENT-REPORT-OWNER) is a valid CURRENT SQLID, then this SQL statement is used to select reports from Q.REPORTS:

```
SELECT ...
FROM Q.REPORT
WHERE ENVIRONMENT IN ('T', 'B'
   AND REPORT_OWNER = :CURRENT-REPORT-OWNED
```

If the current report owner is not a valid CURRENT SQLID, then this SQL statement is used to select reports from Q.REPORTS:

```
SELECT ...
FROM Q.REPORTS
WHERE ENVIRONMENT IN ('T', 'B')
   AND REPORT_OWNER = :CURRENT-REPORT-OWNER
   AND SHARED = 'Y'
```

What reports show up in the selection list under CICS

When a CICS report is created, two attributes are assigned that determine in which selection lists it will be included.

- Environment
- Report Owner

Environment, defines the environment in which the report can run. Only CICS programs show up in selection lists when using the End User Facility under CICS.

The second attribute is the Report Owner. Users are authorized to use a given report (regardless of its Shared Status) if they can set their CURRENT SQLID to the owner of the report. In addition, under CICS a user is authorized to use a given report if the Report Owner matches the transaction ID used to invoke the End User Facility. For example, if the End User Facility transaction ID is RAAE, any user authorized to run that transaction can use reports whose Report Owner is T=RAAE.

Given the above description, here is the SQL statement used to obtain the reports to display in the selection list:

```
SELECT ...
FROM Q.REPORTS
WHERE ENVIRONMENT = 'C'
   AND (REPORT_OWNER = CURRENT SQLID
      OR REPORT_OWNER = 'T='||EIBTRANID)
```

Because Shared Status is ignored for CICS reports, it is recommended that CICS sites register all reports with a Shared Status of **no** and a Report Owner of the form **T=tranid .**This forces report list selection to be tied to transaction ID authorization.

Supplying runtime variable values for batch reports

When you select a batch report that uses runtime variables, a panel on which you can enter values for those variables is displayed before the report is run. In fact, you can supply multiple sets of runtime variables before the report is run. The Prompting For Variable Set * panel , shown below, is used to supply runtime variable values.

```
DB2P -- Prompting For Variable Set #1 --------------------------------- 6.1.0
 COMMAND ===>                                                   SCROLL ===> PAGE


 Assign Values To Variable Set #1
 --------------------------------

1. Press ENTER to accept input for this variable set.
2. Type CANCEL or press PF3 to process report and end variable prompting.
3. Type ABORT to cancel this report request.

Variable :                                Type :
Value ===>
****************************** BOTTOM OF DATA ********************************
```

If you press Enter, this indicates that all runtime variable values for the current variable set have been supplied. All input data for the current variable set will be validated. If you enter any values that do not conform to the listed data types, the panel will be redisplayed with an error message. If there are no errors, prompting resumes for the next variable set.

If you press PF3, all input data for the current variable set will be ignored. The JCL for this report will be generated and will include all of the previously supplied variable sets. If the report was selected with S, then the JCL will be submitted and you will return to the Report Selection List panel. If the report was selected with E, then the JCL will be edited.

If you type ABORT and press Enter, no JCL will be generated and you will return to the Report Selection List panel.

Supplying runtime variable values for online reports

When you select an online report that uses runtime variables, a panel on which you can enter values for those variables is displayed before the report is run. The Prompting For Variables panel , shown below, is used to supply runtime variable values.

```
DB2P -- Prompting For Variables ----------------------------------------- 6.1.0
COMMAND ===>                                                  SCROLL ===> PAGE


 Assign Values To Variables
 --------------------------
1. Press ENTER to process report with these variable values.
2. Type CAN or CANCEL or press PF3 to cancel processing.


 Variable :                                       Type :
 Value ===>
******************************* BOTTOM OF DATA ********************************
```

If you press Enter, this indicates that all runtime variable values have been supplied. All input data for these variable sets will be validated. If you enter any values that do not conform to the listed data types, the panel will be redisplayed with an error message. If there are no errors, the selected report will be processed.

After the report ends, you will return to this panel and all previous variable values will be redisplayed. If you want to run the report again with different input variables, simply specify the new variable values and press Enter again.

If you press PF3, all input data will be ignored and you will return to the Report Selection List panel. Under CICS, pressing CLEAR will perform the same function.

Setting default parameters (TSO only)

Under TSO, the End User Facility uses a collection of default parameter settings. These default settings are saved from session to session in your ISPF profile data set (under an application ID of RAAX). You can set these default parameters by selecting option D from the End User Facility Selection Menu.

```
DB2P -- Set Default Parameters ----------------------------------------- 6.1.0


  COMMAND ===>

1. Report Owner....................... ===>
2. Report DCB Parameters...
        SYSOUT CLASS..................... ===>
        LRECL............................ ===>
        DEST............................. ===>
        COPIES........................... ===>
3. Job Parameters (used only if Job Cards are left blank)...
        CLASS............................ ===>
        MSGCLASS......................... ===>
4. Job Cards...
   ===>
   ===>
   ===>
   ===>
5. Write JCL To...
        Data Set ===>
        Member.. ===
6. QMF∕REXX Initialization Program..... ===>
7. QMF Profile Key (T=TSOID, P=PRIMEID) ===>
```

If you press Enter, all input fields will be validated. If any errors are detected
during input validation, the panel will be redisplayed with an error message.
If there are no errors, then these default values will be saved.

If you press PF3, all input fields will be ignored and you will return to the
End User Facility Selection Menu. The previous default values will be
restored.

The fields on the panel are:

Report Owner
> Use this field to control which reports are to be included in the
> selection list. If you leave this field blank, your current SQLID will be
> used as the default owner.

SYSOUT CLASS
> Specify the SYSOUT class for the REPORTnn DDs. If you leave this
> field blank, a system default value will be used.

LRECL
> Specify the LRECL for the REPORTnn DDs. If you leave this field
> blank, 133will be used.

DEST Specify the DEST for the REPORTnn DDs. If you leave this field
> blank, a system default value will be used. If no system default value
> exists, the DEST parameter will be omitted.

COPIES

Specify the COPIES for the REPORTnn DDs. This number must be between 1 and 254. If you leave this field blank, the COPIES parameter will be omitted.

CLASS

Specify the value to use for the job CLASS parameter. If you leave this field blank, a system default value will be used.

MSGCLASS

Specify the value to use for the job MSGCLASS parameter. If you leave this field blank, a system default value will be used.

Job Cards

These job cards will be used when generating JCL for batch programs. If left blank, system default job cards will be used.

Data Set

Enter the data set to which the generated JCL should be written. The data set must exist. If the name is enclosed in single quotes, it is taken to be a fully qualified TSO data set name. Otherwise, your current TSO profile prefix is used to qualify the name. If it is a PDS, do not specify a member name here; use the **Member** field. You can also enter the name *TEMP to specify that a temporary data set should be created for the JCL.

Member

If the specified **Data Set** is a PDS, enter the name of the member to which the generated JCL should be written. If the `Data Se`t is not a PDS or is *TEMP, this field must be left blank.

QMF/REXX Initialization Program

If your site uses a REXX program other than the default (DSQSCMDE) to set default QMF start-up parameters, enter its name here.

QMF Profile Key

QMF Version 3 and later provides the ability to select your profile based either on your TSO logon ID or your primary SQLID. If this field is set to T, your TSO ID is used. If it is set to P, your primary SQLID is used. This field is not used for QMF Version 2.

Chapter 4. QMF HPO⁄Manager

Welcome to QMF HPO⁄Manager, the family of system utilities for managing and administering IBM's Query Management Facility (QMF).

Manager comprises these integrated components:
- The HPO⁄Governor Module
- The HPO Activity Log
- Online facilities

The HPO⁄Governor Module

The HPO⁄Governor Module completely replaces the QMF sample governor and is the direct interface into QMF processing for Manager. This enhanced governor module is more than a QMF governor, as it services the following facilities:

Object Manager tracks QMF session activity. It records information about the commands and objects being processed and writes this information directly to the HPO Activity Log.

Governor controls QMF session activity. It obtains thresholds and controls from resource groups in the same way as the QMF sample governor, but provides a much wider and more flexible set of controls. These controls are used to enforce proper use of resources in QMF sessions.

Monitor supplies a real time user interface to QMF session activity information. It accepts administrator commands and passes them on to The HPO⁄Governor Module. This facility can only be activated for QMF/TSO sessions.

Query Analyzer provides preemptive governing capabilities. It traps queries before they are processed by DB2 and estimates their resource consumption. Queries that are judged too intensive can be canceled before they run. This facility can only be activated for QMF/TSO sessions.

Note: Important: When running QMF under TSO, QMF looks for a governor module named DSQUEGV1. When running QMF under CICS, QMF looks for a governor module named DSQUEGV3. The HPO⁄Governor Modules and the QMF sample governor modules have the same name. "Step 4b. Special allocations for The HPO⁄Governor Module" on page 234

page 234 explains what is necessary to ensure that QMF finds The HPO/Governor Modules instead of the sample governor modules.

The HPO Activity Log

The HPO Activity Log is a repository for QMF session activity and object usage information. The HPO/Governor Module writes directly to the HPO Activity Log data sets. You must run a batch job periodically to copy the HPO Activity Log data sets to the HPO Activity Log tables. You can use the HPO Activity Log JCL facility to create the JCL to run this batch job.

Online facilities

These online facilities help organize and simplify the administration and management of QMF:

- Object Manager
- Governor
- Monitor
- Query Analyzer
- User Profile
- Error Log
- Spill File
- HPO Activity Log JCL
- QMF Start-Up Parameters

Starting HPO/Manager

You can display the Manager Selection Menu by issuing the following TSO command:

```
CALL 'QMFHPO.SRAALOAD(RAAMAIN)' 'M2'
```

```
QMF HPO/Manager -- Selection Menu ------------------------------------- 6.1.0
ENTER SELECTION ===>
                           DB2 ID   ===> DB2P
                           Location ===> DB2PLOCATION
                           User ID:
                           Date:
                           Time:
--------------------------------------------------------------------
   1  Object Manager                 7  Spill File
   2  Governor                       8  HPO Activity Log JCL
   3  Monitor                        9  QMF Start-Up Parameters
   4  Query Analyzer                10  Object Manager Reports
   5  User Profile                   X  Exit
   6  Error Log
--------------------------------------------------------------------
5645-DB2 Copyright (C) 1998 IBM Corp.  All Rights Reserved.
Copyright (C) 1998 Rocket Software, Inc. All Rights Reserved.
IBM is a registered trademark of International Business Machines Corporation.
Rocket is a registered trademark of Rocket Software, Inc.
--------------------------------------------------------------------
```

You can invoke each of the menu options using the listed one-character
selection codes.

Chapter 5. Object Manager

As users build QMF objects (queries, forms, and procedures), the QMF object tables become more populated. There is a negative impact on performance as the object tables increase in size. As an administrator, you need to maintain control over the QMF objects; you need to know who owns what objects, what objects are obsolete, what objects need to be transferred to new owners and DB2 subsystems, and so on.

As users leave your environment, they typically leave behind a set of queries, forms, and procedures. With Object Manager you can quickly and efficiently transfer those objects to a new owner or simply drop the unowned objects

Object Manager's integrated components provide the necessary functions for QMF and DB2 database administrators to effectively track and manage QMF objects.

Object Manager comprises three main components:
- The HPO Activity Log
- Online facilities
- Reports

In addition, The HPO/Governor Module provides Object Manager's direct interface into QMF processing.

The HPO Activity Log

The HPO Activity Log is a repository for QMF session activity and object usage information. For example, when an object is erased from the system, the object name, the user ID of the person who issued the erase command, and the date and time will be recorded. All QMF object activity, including ad hoc activity, is tracked.

The HPO/Governor Module writes directly to the HPO Activity Log data sets. A batch job, automatically generated by the HPO Activity Log JCL facility, is run periodically to copy the HPO Activity Log data sets to the HPO Activity Log tables.

An exit is provided from The HPO/Governor Module to allow custom processing against the activity log records before they are actually written to the HPO Activity Log data sets. Each log record can be examined and marked for inclusion into or exclusion from the log. In essence, this exit can be used

to selectively track QMF object activity. Sample assembler source code for this exit is provided in QMFHPO.SRAASAMP in the member named RAAOBJX .

Online facilities

You can review and manipulate QMF objects using the Object Manager online facilities. Two types of actions are supported, those that operate on one object and those that can operate on a set of objects.

The following actions operate on only one object at a time:
- Browsing an object
- Viewing the first-used and last-used statistics for an object
- Reviewing historical CPU time consumption and rows fetched for a query
- Reviewing historical CPU time consumption and rows fetched for a proc
- Reviewing the SQL text associated with the running of a query
- Renaming an object
- Adding or modifying remarks for an object
- Changing the restricted status of an object
- Invoking Program Generator
- Cross referencing objects with their generated programs

The following actions can operate on one or more objects at a time:
- Copying one or more objects
- Transferring one or more objects
- Dropping one or more objects
- Reviewing QMF usage statistics for one or more objects

You can use Object Manager to build selection lists of QMF objects. Lists can be qualified by owner, name, type, and even usage statistics. These lists can be used to help you identify dormant objects, frequently used objects, or resource intensive objects. From a list, it is easy for you to drop dormant objects or compile frequently used or resource intensive objects. It is possible to directly invoke Program Generator from an Object Manager selection list.

Object Manager obtains first-used, last-used, and last-modified statistics and historical query and procedure statistics from the HPO Activity Log tables. In addition, the Object Manager online facilities write directly to the HPO Activity Log data sets when they drop or add objects.

Reports

A series of reports turn the HPO tracking data into information that can be used to properly manage a QMF environment:

- Cancellation summary
- Cancellation detail for a user
- Performance summary based on maximum CPU
- Performance summary based on average CPU
- Performance summary for a query
- Performance detail for a query
- Resource consumption detail for a user
- Resource usage summary
- Resource usage summary for a time period
- Chargeback summary for a time period

These reports can be run using the Object Manager online facilities. Sample JCL is also provided in QMFHPO.SRAASAMP for batch reporting.

Starting Object Manager

You perform all object management from the Object Manager panel , which you can access by selecting option 1 from the Manager Selection Menu, or by issuing the following TSO command:

```
CALL 'QMFHPO.SRAALOAD(RAAMAIN)' 'RM O'
```

```
DB2P ∕ DB2PLOCATION -- Object Manager ------------------------6.1.0
COMMAND ===>
Action................... ===>
Object Owner............. ===>
Object Name.............. ===>
Object Type (Q∕P∕F∕%)..... ===>
Additional List Filtering? ===>
Drop Confirmation? (Y∕N).. ===>
----------------------------------------------------------------
Valid Actions Are...
B  Browse                    Q  QMF Activity Summary
H  Detail History            R  Change Restricted Status
N  Rename                    V  View Statistics and Remarks
P  Invoke Program Generator  X  Objects∕Reports Cross Reference

These actions support % and _ wildcard characters in Object Name...
C  Copy                      L  Display Selection List
D  Drop                      T  Transfer
----------------------------------------------------------------
```

If you press Enter, all input fields will be processed. If any errors are detected during input validation, the panel will be redisplayed with an error message.

If you press PF3, all input fields will be ignored and you will return to the previous menu.

Building a selection list of objects

To build a selection list of QMF objects from the Object Manager panel, you must enter the following fields:

Action
> Enter L (for list).

Object Owner
> Enter the owner of the object you want to list. You can use % and _ as wildcard characters in the owner to select objects from multiple owners.

Object Name
> Enter the name of the object you want to list. You can use % and _ as wildcard characters in the name to select multiple objects. If you leave this field blank, % will be used as a default.

Object Type
> Enter Q, P or F to list queries, procedures, or forms only. For all object types, enter %. If you leave this field blank, % will be used as a default.

Additional List Filtering?
> Enter Y to further qualify the objects to include in the selection list. If further qualification is requested, the List Filter Specification panel will be displayed. Enter N to bypass additional list filtering.

Drop Confirmation?
> Enter Y to request drop confirmations or N to suppress them. This value will be carried forward to all actions performed from the selection list. If this flag is left blank, Y will be used as a default.

Additional list filtering

When you enter L (for list) on the Object Manager panel and the `Additional List Filtering?` flag is set to Y, the List Filter Specification panel is displayed. This panel displays the set of filters that you can use to further qualify the object selection list. An object must pass all of the enabled filters to be included in the selection list

```
DB2P / DB2PLOCATION -- List Filter Specification--------------- 3.3.
COMMAND ===>

Enable? Description
------- ----------------------------------------------------------
        Show only queries/procs that ran more than (CPU seconds)...
        Show only queries/procs run more than (number of times)....
        Show only queries/procs that have ever been canceled.
        Show only queries/procs run by user (TSO ID)...............
        Show only queries/procs run by user (SQLID)...............
        Show only objects      that have not been used since......
        Show only objects      that have been used on or since....
        Show only queries/procs that have not been run since.......
        Show only queries/procs that have been run on or since.....
        Show only objects      that include the text listed below.
        (Warning: resource intensive filter)......................

        Carry filtering through to History panel? (Y/N)....... ===>
```

.

If you press Enter, all enabled filters will be processed. An object must pass all enabled filters to be included in the selection list. That is, if more than one filter is enabled, these conditions are combined with the 'AND' operator.

If you press PF3, all input fields will be ignored and you will return to the Object Manager panel.

The fields on the panel are:

Show only queries that ran more than * CPU seconds.
> Enter Y in the **Enable**? column to enable this filter. A query must have run for more than the specified number of CPU seconds in order for it to be included in the selection list. This is useful for identifying resource intensive queries. Enter N in the **Enable**? column to disable this filter.

Show only queries/procs run more than * times.
> Enter Y in the **Enable**? column to enable this filter. A query or proc must have been run more than the specified number of times in order for it to be included in the selection list. This is useful for identifying frequently used queries and procs. Enter N in the **Enable**? column to disable this filter.

Show only queries/procs that have ever been canceled.
> Enter Y in the **Enable**? column to enable this filter. A query or proc must have been canceled at least once in order for it to be included in the selection list. This is useful for identifying frequently canceled queries and procs. Enter N in the **Enable**? column to disable this filter.

Show only queries/procs run by user (TSO ID) *.
Enter Y in the **Enable**? column to enable this filter. This is useful for identifying specific user's actions under QMF. Enter N in the **Enable**? column to disable this filter.

Show only queries/procs run by user (SQLID) *.
Enter Y in the **Enable**? column to enable this filter. This is useful for identifying specific user's actions under QMF. Enter N in the **Enable**? column to disable this filter.

Show only objects that have not been used since YYYY-MM-DD.
Enter Y in the **Enable**? column to enable this filter. An object must not have been used since the specified date in order for it to be included in the selection list. This is useful for identifying dormant objects. Enter N in the **Enable**? column to disable this filter.

Show only objects that have been used on or since YYYY-MM-DD.
Enter Y in the **Enable**? column to enable this filter. An object must have been used on or since the specified date in order for it to be included in the selection list. This is useful for identifying frequently used objects. Enter N in the **Enable**? column to disable this filter.

Show only queries/procs that have not been run since YYYY-MM-DD.
Enter Y in the **Enable**? column to enable this filter. A query or proc must not have been run since the specified date in order for it to be included in the selection list. This is useful for identifying dormant queries and procs. Enter N in the **Enable**? column to disable this filter.

Show only queries/procs that have been run on or since YYYY-MM-DD.
Enter Y in the **Enable**? column to enable this filter. A query or proc must have been used on or since the specified date in order for it to be included in the selection list. This is useful for identifying frequently used queries and procs. Enter N in the **Enable**? column to disable this filter.

Show only objects that include the text listed below.
Enter Y in the **Enable**? column to enable this filter. An object must contain the text that you specify for it to be included in the selection list. This is useful for locating queries that reference a specific table or column. Enter N in the **Enable**? column to disable this filter. Note: It is resource intensive to search queries , forms, and procs for specific text. When you enable this option, expect to wait longer for results to be displayed.

Carry filtering through to History panel?
Enter Y to carry the filter specifications through to the History panel. That is, when you select an action of H (history) from the object selection list, the filter specifications will be applied to the historical tracking data before it is displayed. For example, if a date filter is

specified, then the tracking data will be compared against the date filter and only that data that passed the filter will be displayed. To disable the carry forward option, enter N. If you leave this field blank, Y is assumed.

Object Selection List panel

When you enter L (for list) on the Object Manager panel, the Object Manager Selection List panel is displayed. This panel contains a list of all QMF objects that match the input specifications entered on the Object Manager panel and, if specified, the List Filter Specification panel.

```
DB2P ∕ DB2PLOCATION -- Object Manager Selection List-----------6.1.0
COMMAND ===>                                       SCROLL ===> PAGE

Valid Actions Are...

B  Browse                      P  Invoke Program Generator
C  Copy                        R  Change Restricted Status
D  Drop                        T  Transfer
H  Detail History              V  View Statistics and Remarks
N  Rename                      X  Object∕Reports Cross Reference
----------- ------------------<--First Used-->   <--Last Used--->
Act     Object Owner ∕ Object Name  T R Date Time Date    Time
---     --------------------------  - - ---- ---- ----    ----

************************** BOTTOM OF DATA**************************
```

If you press Enter, all rows that are selected with an action code will be processed. After all selected rows are processed, the panel will be redisplayed with an informative message on each row (such as *UPDATE or *NODROP). This message will appear in the space between the **Act** and `Object Owner` columns.

You may **LOCATE** an object by object name only from the command line. Enter any abbreviation of the word "locate" (e.g., "L" or "LOC") followed by the object name to automatically scroll down to the desired object. Note that if multiple object owners are included in this list, only the first owner's list will be searched.

If you press PF3, all input fields will be ignored and you will return to the Object Manager panel.

If you press PF8 or PF7, the panel will scroll forward or backward after all selected rows have been processed.

Browsing an object

You can browse a QMF object (and optionally analyze a QMF query) from a
selection list or directly from the Object Manager panel. You can browse SQL
or PROMPTED queries, and procedures. You cannot browse ad hoc queries
(*ADHOC).

Browsing directly

To browse a QMF object from the Object Manager panel, you must enter the
following fields:

Action
> Enter B (for browse).

Object Owner
> Enter the owner of the object. No wildcard characters are allowed.

Object Name
> Enter the name of the object. No wildcard characters are allowed.

Object Type
> Enter Q or P to specify query or procedure. If the type is unknown,
> enter %.

Browsing from a selection list

To browse a QMF object from the Object Manager Selection List panel, you
must enter the following field:

Action
> Enter B (for browse).

Object Browse panel

The object is displayed on the Object Browse panel.

```
DB2P ∕ DB2PLOCATION -- Query QMFUSER.QUERY1-------------------6.1.0
COMMAND===>                                        SCROLL ===> PAGE

Valid Commands Are...
ANALYZE to invoke Query Analyzer (valid only for queries).

    ----------------------------------------------------------------
    **************************BOTTOM OF DATA *************************
```

If you enter the command ANALYZE on the command line and press Enter,
Query Analyzer will be directly invoked with the QMF query identified on

this panel. This command is only valid for QMF queries. When you exit Query Analyzer, you will return to this panel.

If you press PF3, you will return to the previous panel.

If you press PF8 or PF7, the panel will scroll forward or backward.

Dropping an object

You can drop a QMF object or multiple objects (with the same owner) from a selection list or directly from the Object Manager panel. Ad hoc queries (*ADHOC) cannot be dropped.

Dropping directly

To drop a QMF object from the Object Manager panel, you must enter the following fields:

Action
Enter D (for drop).

Object Owner
Enter the owner of the object. No wildcard characters are allowed.

Object Name
Enter the name of the object. You can use % and _ as wildcard characters in the name to copy multiple objects. If you leave this field blank, % will be used as a default.

Object Type
Enter Q, P, or F to drop queries, procedures, or forms only. For all object types, enter %. If you leave this field blank, % will be used as a default.

Drop Confirmation?
Enter Y to request a drop confirmation panel or N to suppress one. If this flag is left blank, Y will be used as a default.

Dropping from a selection list

To drop a QMF object from the Object Manager Selection List panel, you must enter the following field:

Action
Enter D (for drop).

Object Drop Confirmation panel

The number of objects to be dropped is shown on the Object Drop
Confirmation panel.

```
DB2P / DB2PLOCATION -- Object Drop Confirmation---------------6.1.0
COMMAND ===>

Press ENTER to confirm this DROP request.
Type CAN or CANCEL or press PF3 to cancel this DROP request.

Object Owner.. :
Object Name... :
Object Type... :
Number of objects to be deleted :
```

If you press Enter, the QMF objects identified on the panel will be dropped
from the database, the HPO Activity Log will be updated, and you will return
to the previous panel.

If you press PF3, the drop command will be ignored, the QMF objects will
remain in the database, and you will return to the previous panel.

Copying an object

You can copy QMF objects from a selection list or directly from the Object
Manager panel. The Copy action does not drop or delete the originally
specified object (or set of objects). Ad hoc queries (*ADHOC) cannot be
copied.

Copying directly

To copy a QMF object or multiple objects using the Object Manager panel,
you must enter the following fields:

Action
> Enter C (for copy).

Object Owner
> Enter the owner of the object. You can use % and _ as wildcard
> characters in the owner to copy objects from multiple owners.

Object Name
> Enter the name of the object. You can use % and _ as wildcard
> characters in the name to copy multiple objects. If you leave this field
> blank, % will be used as a default.

Object Type
Enter Q, P, or F to copy queries, procedures, or forms only. For all object types, enter %. If you leave this field blank, % will be used as a default.

Copying from a selection list

To copy a QMF object from the Object Manager Selection List panel, you must enter the following field:

Action
Enter C (for copy).

Copy Object panel

The **From** information is displayed along with the number of QMF objects that will be processed.

```
DB2P ⁄ DB2PLOCATION -- Copy Object----------------------------6.1.0
COMMAND ===>

Press ENTER to process this COPY request.
Type CAN or CANCEL or press PF3 to cancel this COPY request.

From DB2 Subsystem.......... :
     Location............... :
     Object Owner........... :
     Object Name............ :
     Object Type (Q⁄P⁄F⁄%).. :
     Object Count........... :

To   Local DB2 Subsystem. ===>
     Location............ ===>
     New Owner........... ===>
     New Name............ ===>
     Replace Duplicates?. ===>
```

If you press Enter, the QMF objects identified on the panel will be processed, the database will be updated, the HPO Activity Log will be updated, and you will return to the previous panel.

If you press PF3, the command will be ignored, the objects will remain unchanged, and you will return to the previous panel.

The fields on the panel are:

From DB2 Subsystem and Location
These fields identify the source QMF system of the original objects. **Location** will only be specified if DB2 Version 2 Release 3 or higher is installed and if DDF is active.

To DB2 Subsystem and Location

These fields identify the QMF system in which a copy of the source objects will be created. You can only specify **Location** if DB2 Version 2 Release 3 or higher is installed and if DDF is active. You may leave the `To DB2 Location` blank to specify the default location for the `To DB2 Subsystem.`

New Owner

Enter a value in this field to create a new set of objects with a different owner from the **From Object Owner**.

New Name

Enter a value in this field to create a new object with a different name than the **From Object Name**. You can only enter a value in this field when you are processing one object (that is, when `Object Count` is equal to 1). You cannot use any of the following QMF reserved words as the new name: CHART, DATA, FORM, FORM., PROC, PROFILE, QUERY, REPORT, and TABLE.

Replace Duplicates?

This flag controls what happens if an object already exists with the same name as one you are trying to create. If you enter `Y`, the new object will replace the existing object of the same name. If you enter `N`, the new object will not be created.

Transferring an object

You can transfer QMF objects from a selection list or directly from the Object Manager panel. The Transfer action drops or deletes the originally specified object (or set of objects). Ad hoc queries (*ADHOC) cannot be transferred.

Transferring directly

To transfer a QMF object or multiple objects using the Object Manager panel, you must enter the following fields:

Action

Enter `T` (for transfer).

Object Owner

Enter the owner of the object. No wildcard characters are allowed.

Object Name

Enter the name of the object. You can use % and _ as wildcard characters in the name to transfer multiple objects. If you leave this field blank, % will be used as a default.

Object Type

> Enter Q, P, or F to transfer queries, procedures, or forms only. For all object types, enter %. If you leave this field blank, % will be used as a default.

Transferring from a selection list

To transfer a QMF object from the Object Manager Selection List panel, you must enter the following field:

Action

> Enter T (for transfer).

Transfer Object panel

The **From** information is displayed along with the number of QMF objects that will be processed.

```
DB2P ⁄ DB2PLOCATION -- Transfer Object ---------------------- 6.1.0
COMMAND ===>

From DB2 Subsystem........ :
     Location............. :
     Object Owner......... :
     Object Name.......... :
     Object Type (Q⁄P⁄F⁄%). :
     Object Count......... :

To   DB2 Subsystem...... ===>
     Location.......... ===>
     New Owner.......... ===>
     New Name.......... ===>
     Replace Duplicates? ===>
```

Press ENTER to process this TRANSFER request.

Type CAN or CANCEL or press PF3 to cancel this TRANSFER request.

If you press Enter, the QMF objects identified on the panel will be processed, the database will be updated, the HPO Activity Log will be updated, and you will return to the previous panel.

If you press PF3, the command will be ignored, the objects will remain unchanged, and you will return to the previous panel

The fields on the panel are:

New Owner

> If you are transferring a set of objects, enter the new owner for the

objects. You must specify a different owner from the **From Object Owner.** If you are transferring only one object, enter the new owner for the object, or specify the same owner as the `From Object Owner`, in which case you must specify a different object name in the `New Name field`.

New Name
> If you are transferring a set of objects, you cannot enter a value in this field. If you are transferring only one object, enter the new name for the object. If the object is being transferred to a different owner, you can specify the same name as the **From Object Name**. Otherwise, you must specify a different name. You cannot use any of the following QMF reserved words as the new name: CHART, DATA, FORM, FORM., PROC, PROFILE, QUERY, REPORT, and TABLE.

Replace Duplicates?
> This flag controls what happens if an object already exists with the same name as one you are trying to create. If you enter `Y`, the new object will replace the existing object of the same name. If you enter `N`, the new object will not be created.

Renaming an object

You can rename QMF objects from a selection list or directly from the Object Manager panel, however you can only rename one object at a time. Ad hoc queries (*ADHOC) cannot be renamed.

Renaming directly

To rename a QMF object using the Object Manager panel, you must enter the following fields:

Action
> Enter `N` (for name).

Object Owner
> Enter the owner of the object. No wildcard characters are allowed.

Object Name
> Enter the name of the object. No wildcard characters are allowed.

Object Type
> Enter `Q`, `P`, or `F` to rename queries, procedures, or forms only. For all object types, enter %. If you leave this field blank, % will be used as a default.

Renaming from a selection list

To rename a QMF object from the Object Manager Selection List panel, you must enter the following field:

Action
> Enter N (for name).

Rename Object panel

The **From**information is displayed along with the number of QMF objects that will be processed.

```
DB2P / DB2PLOCATION -- Rename Object ------------------------ 6.1.0
COMMAND ===>

Press ENTER to process this RENAME request.
Type CAN or CANCEL or press PF3 to cancel this RENAME request.

From DB2 Subsystem......... :
     Location.............. :
     Object Owner.......... :
     Object Name........... :
     Object Type (Q/P/F/%). :
     Object Count.......... :

To   DB2 Subsystem...... ===>
     Location........... ===>
     New Owner.......... ===>
     New Name........... ===>
     Replace Duplicates? ===>
```

If you press Enter, the QMF object identified on the panel will be processed, the database will be updated, the HPO Activity Log will be updated, and you will return to the previous panel.

If you press PF3, the command will be ignored, the object will remain unchanged, and you will return to the previous panel.

The fields on the panel are:

New Name
> Enter the new name of the object. You must specify a different value from the **From Object Name**. You cannot use any of the following QMF reserved words as the new name: CHART, DATA, FORM, FORM., PROC, PROFILE, QUERY, REPORT, and TABLE.

Replace Duplicates?
> This flag controls what happens if an object already exists with the

same name as one you are trying to create. If you enter Y, the new
object will replace the existing object of the same name. If you enter N,
the new object will not be created.

Toggling the restricted status of an object

You can toggle the restricted status of a QMF object between restricted and
shared from a selection list or directly from the Object Manager panel. Ad hoc
queries (*ADHOC) cannot have their status modified.

Toggling the restricted status directly

To toggle the restricted status of a QMF object from the Object Manager panel,
you must enter the following fields:

Action
> Enter R (for restricted status).

Object Owner
> Enter the owner of the object. No wildcard characters are allowed.

Object Name
> Enter the name of the object. No wildcard characters are allowed.

Object Type
> Enter Q, P, or F to specify a query, procedure, or form. If the type is
> unknown, enter %.

Toggling the restricted status from a selection list

To toggle the restricted status of a QMF object from the Object Manager
Selection List panel, you must enter the following field:

Action
> Enter R (for restricted status).

Viewing object statistics and remarks

You can view QMF object statistics, view object remarks, and add or modify
object remarks from a selection list or directly from the Object Manager panel.
You can view statistics collected for ad hoc queries (*ADHOC) from this
panel.

Viewing object statistics and remarks directly

To view QMF object statistics from the Object Manager panel, you must enter
the following fields:

Action
> Enter V (for view statistics).

Object Owner
> Enter the owner of the object. No wildcard characters are allowed.

Object Name
> Enter the name of the object. No wildcard characters are allowed.

Object Type
> Enter Q, P, or F to specify a query, procedure, or form. If the type is unknown, enter %.

Viewing object statistics and remarks from a selection list

To view QMF object statistics from the Object Manager Selection List panel, you must enter the following field:

Action
> Enter V (for view statistics).

View Statistics And Remarks panel

Object statistics and remarks are displayed on this panel.

```
DB2P ╱ DB2PLOCATION -- QMFUSER.QUERY1 ----------------------- 6.1.0
COMMAND ===>

Overtype remarks to change.
Press ENTER to save new remarks.
Type CAN or CANCEL or press PF3 to leave remarks unchanged.

Remarks ===>

Type.................. :          Subtype................ :
Restricted Status...... :        Model.................. :
Object Level.......... :         Number of Times Run..... :
Number of Times Used... :        Number of Times Canceled :

Object Activity       First Used   Last Used    Last Modified
Date.................. :          .....        .....
Time.................. :          .....        .....
TSOID................. :          .....        .....
Current SQLID.......... :         .....        .....
Environment............ :         .....        .....
Mode.................. :          .....        .....
QMF Command............ :         .....        .....
```

If you enter the command COMPILE on the command line and press Enter, Program Generator will be directly invoked with the QMF object identified on

this panel. This command is only valid for QMF queries and procedures. When you exit Program Generator, you will return to this panel.

Note: Important: You can only invoke Program Generator if Compiler is installed on your **system**. If it is not installed, a message will be displayed telling you this.

If you press Enter and you modify the **Remarks** field, the remarks for this object will be modified and you will return to the previous panel.

If you press Enter and you do not modify the **Remarks** field, the remarks for this object will remain unchanged and you will return to the previous panel.

If you press PF3, you will return to the previous panel and the remarks for this object will remain unchanged.

The field on the panel is:

Remarks
> Enter the remarks for this object.

Viewing detail history

You can view QMF detail history for queries and procs from a selection list or directly from the Object Manager panel. You can view statistics collected for ad hoc queries (*ADHOC) and ad hoc procs (*ADHOCP) from this panel as well.

Viewing detail history directly

To view QMF detail history from the Object Manager panel, you must enter the following fields:

Action
> Enter H (for history).

Object Owner
> Enter the owner of the query or proc. No wildcard characters are allowed.

Object Name
> Enter the name of the query or proc. No wildcard characters are allowed.

Object Type
> Enter Q to specify a query or P to specify a proc.

Viewing detail history from a selection list

To view QMF detail history from the Object Manager Selection List panel, you must enter the following field:

Action
> Enter H (for history).

View Query History panel

Query history is displayed on this panel.

```
DB2P ⁄ DB2PLOCATION -- Query QMFUSER.QUERY1 -------------------- 6.1.0
COMMAND ===>                                          SCROLL ===> PAGE
Valid Actions Are...
B  Browse SQL Text

Total number of times run............:
Rows: Minimum :            Average :              Maximum :
CPU : Minimum :            Average :              Maximum :

                                                        M
A                                                     E O C S
C  Start      Elapsed                                 N D A Q
T  Date       Time     Time     TSOID    SQLID  Rows  CPU   V E N L
   -----      -----    -----    -----    -----  ----  ---  - - - -

****************************BOTTOM OF DATA****************************
```

If you press Enter, all rows that are selected with an action code of B (to browse query text) will be processed. If there is no query text to browse for the selected row, the row will be bypassed. After all selected rows are processed, the panel will be redisplayed.

If you press PF3, all input fields will be ignored and you will return to the previous panel.

If you press PF8 or PF7, the panel will scroll forward or backward after all selected rows have been processed.

The fields on the panel are:

Total number of times run
> This field indicates the number of times this query has been run. If additional list filtering has been carried forward, the number of detail records displayed on this panel may be less than this value. If additional list filtering has been carried forward, an information message will be displayed on the panel's message line.

ACT (Action)

Set this field to `B` to browse SQL text.

ENV (Environment)

This column indicates the environment under which the object was run. `T` indicates TSO, `C` indicates CICS, and `O` or `H` indicates the action was performed in HPO Object Manager.

MODE

This column indicates the mode under which the object was run. `O` indicates online and `B` indicates batch.

CAN (Cancel code)

This column indicates whether or not the query was canceled. If it was not canceled, a zero will be displayed. If it was canceled, a one character code will be displayed. See "Appendix H. The HPO/Governor Module cancel codes" on page 329 for a discussion of the values that can appear in this column.

SQL (SQL text indicator)

This column indicates whether or not there is any SQL text available for browsing. If SQL text is available, this flag is set to `Y`. If no text is available, this flag is set to `N`. SQL text is only available for those queries whose CPU consumption exceeds an installation-defined threshold. For more information about this threshold and SQL text tracking, see "Step 12f. Set The HPO/Governor Module configuration parameters" on page 245.

SQL Text Browse panel

The query text for the selected row is displayed on the SQL Text Browse panel. This is the actual SQL statement that was run in QMF. For queries stored in QMF, this may be different from the current SQL statement stored in QMF. This is the only panel from which you can browse ad hoc query text.

```
   DB2P ⁄ DB2PLOCATION -- QMFUSER.QUERY1 --------------------------------6.1.0
   COMMAND ===>                                                SCROLL ===> PAGE

   Valid Commands Are...
   ANALYZE to invoke Query Analyzer (valid only for queries).
                                                                      Cancel
   Date      Time    TSOID   SQLID   Env  Mode  Rows    CPU        Code
   -----     -----   ------  ------  ---- -----  ----   --------    ----


   ------------------------------------------------------------------------------
   **************************** BOTTOM OF DATA **********************************
```

If you enter the command `ANALYZE` on the command line and press Enter, Query Analyzer will be directly invoked with the QMF query identified on this panel. This command is only valid for QMF queries. When you exit Query Analyzer, you will return to this panel.

If you press PF3, you will return to the previous panel.

If you press PF8 or PF7, the panel will scroll forward or backward.

View Proc History panel

Proc history is displayed on this panel.

```
  DB2P / DB2PLOCATION -- Proc QMFUSER.PROC1 -------------------- 6.1.0
  COMMAND ===>                                      SCROLL ===> PAGE

  Total number of times run............:
  Rows: Minimum :              Average :            Maximum :
  CPU : Minimum :              Average :            Maximum :
                                                                 M
                                                              E O C
            Start   Elapsed                                   N D A
  Date      Time    Time    TSOID   SQLID   Rows    CPU       V E N
  -----     ------  -----   ------  ------  -----   -----     - - -


**************************** BOTTOM OF DATA****************************
```

If you press PF3, you will return to the previous panel.

If you press PF8 or PF7, the panel will scroll forward or backward after all selected rows have been processed.

The fields on the panel are:

TOTAL number of times run
 This field indicates the number of times this proc has been run.

ENV (Environment)
 This column indicates the environment under which the object was run: `TSO`; `CICS`; or `HPO`.

Mode This column indicates the mode under which the object was run: `ONLINE` or `BATCH`.

CAN (Cancel Code)
 This column indicates whether or not the proc was canceled. If it was not canceled, a zero will be displayed. If it was canceled, a one character code will be displayed. See "Appendix H. The

HPO/Governor Module cancel codes" on page 329 for a discussion of the values that can appear in this column.

Invoking Program Generator

You can select a query or a procedure and invoke Program Generator to compile that object into a program. When you exit Program Generator, you will return to the panel from which you selected the action.

Note: Important: You can only invoke Program Generator if Compiler is installed on your system. If it is not installed, a message will be displayed telling you this.

Invoking Program Generator directly

To invoke Program Generator from the Object Manager panel, you must enter the following fields:

Action
> Enter P (for Program Generator).

Object Owner
> Enter the owner of the object. No wildcard characters are allowed.

Object Name
> Enter the name of the object. No wildcard characters are allowed.

Object Type
> Enter Q or P to specify a query or a procedure. If the type is unknown, enter %.

Invoking Program Generator from a selection list

To invoke Program Generator from the Object Manager Selection List panel, you must enter the following field:

Action
> Enter P (for Program Generator).

Object/reports cross reference

You can view which objects have been compiled into programs. If the selected object has been compiled and registered into any report programs, then a list of those programs will be displayed on the Object/Report Cross Reference panel. If no reports have been generated and registered from this object, then an appropriate message is displayed.

Viewing cross references directly

To view the cross reference report from the Object Manager panel, you must enter the following fields:

Action
> Enter X (for cross reference).

Object Owner
> Enter the owner of the object. No wildcard characters are allowed.

Object Name
> Enter the name of the object. No wildcard characters are allowed.

Object Type
> Enter Q, P, or F to specify a query, procedure, or form. If the type is unknown, enter %.

Viewing cross references from a selection list

To view the cross reference report from the Object Manager Selection List panel, you must enter the following field:

Action
> Enter X (for cross reference).

Object/Reports Cross Reference panel

A list of all reports that were generated from the chosen object is displayed on this panel. In addition, the date and time that the program was generated is displayed.

```
 DB2P ⁄ DB2PLOCATION -- Object⁄Reports Cross Reference------------------6.1.0
 COMMAND ===>                                              SCROLL ===> PAGE

 Object Owner......:
 Object Name.......:
 Report Owner     Report Name          Date          Time
 ------------     ------------------   ----------    --------


******************************* BOTTOM OF DATA ******************************
```

If you press PF3, you will return to the previous panel.

If you press PF8 or PF7, the panel will scroll forward or backward.

QMF activity summary

You can use this action to review QMF usage statistics-CPU consumption, rows fetched, and query execution counts. Statistics can be summarized by resource group, date, time, mode, and environment.

To review QMF usage statistics from the Object Manager panel, only the **Action** field must be entered. All other input fields on this panel are ignored. This action can only b

e invoked from the Object Manager panel.

Action

Enter Q (for QMF activity summary).

QMF Activity Summary Filtering panel

The selection criteria for reviewing QMF usage statistics by resource group, date, time, mode, and environment are specified on the following panel.

```
DB2P ∕ DB2PLOCATION -- QMF Activity Summary Filtering --------- 6.1.0
COMMAND ===>


Required Filtering:
Resource Group........... ===>                 (*=ALL)
From Date................ ===>                 (MM∕DD∕YYYY)
To Date.................. ===>                 (MM∕DD∕YYYY)

Optional Filtering:
From Time................ ===>                 (HH.MM.SS)
To Time.................. ===>                 (HH.MM.SS)
Mode..................... ===>                 (1=ONLINE,2=BATCH)
Environment.............. ===>                 (3=TSO,5=CICS)
```

If you press PF3, you will return to the previous panel.

If you press Enter, the selection criteria will be processed and the QMF Activity Summary panel will be displayed.

The required fields on the panel are:

Resource Group

Enter the resource group for which you want to summarize QMF activity. Enter * for all resource groups.

From Date

Enter the start date for QMF activity in MM∕DD∕YYYY format.

To Date

> Enter the end date for QMF activity in MM/DD/YYYY format.

The optional fields on the panel are:

From Time

> Enter the start time for QMF activity in HH.MM.SS format.

To Time

> Enter the end time for QMF activity in HH.MM.SS format. You must leave this field blank if you leave **From Time** blank, and you must specify it if you specify `From Time`.

Mode Enter 1 to display only online activity. Enter 2 to display only batch activity.

Environment

> Enter 3 to display only TSO activity. Enter 5 to display only CICS activity.

QMF Activity Summary panel

The QMF Activity Summary panel is displayed with the results of processing the selection criteria from the previous panel. If **From Time** and `To Time` fil is specified, usage statistics are summarized and displayed only for the specified time range. If `From Time` and `To Time` filtering is omitted, usage statistics are summarized for 12 predefined time ranges. All filtering criteria are displayed in the panel header.

```
  DB2P ╱ DB2PLOCATION -- QMF Activity Summary -------------------- 6.1.0
  COMMAND ===>                                          SCROLL ===> PAGE

  Resource Group....:
  From Date.........:             To Date.....:
  From Time.........:             To Time.....:
  Mode..............:             Environment.:

  Hour             Avg CPU      Max CPU      Avg Rows   Max Rows  Run
  Range            Time         Time         Fetched    Fetched   Count
  --------------   ----------   ----------   ---------  --------- -----


  ***************************** BOTTOM OF DATA ******************************
```

If you press PF3, you will return to the previous panel.

Using the Object Manager reports

The following reports, based on the HPO tracking data, are available to assist in managing a QMF environment.

- Cancellation summary
- Cancellation detail for a user
- Performance summary based on maximum CPU
- Performance summary based on average CPU
- Performance summary for a query
- Performance detail for a query
- Resource consumption detail for a user
- Resource usage summary
- Resource usage summary for a time period
- Chargeback summary for a time period

You can invoke the Object Manager reports by selecting option 10 from the Manager Selection Menu, or by issuing the following TSO command:

```
CALL 'QMFHPO.SRAALOAD(RAAMAIN)' 'RM R'
```

```
DB2P ∕ DB2PLOCATION -- Object Manager Reports ---------------- 6.1.0
ENTER SELECTION ===>

Select one of the options listed below and press ENTER.
  1  Cancellation summary
  2  Cancellation detail for a user
  3  Performance summary based on maximum CPU
  4  Performance summary based on average CPU
  5  Performance summary for a query
  6  Performance detail for a query
  7  Resource consumption detail for a user
  8  Resource usage summary
  9  Resource usage summary for a time period
  10 Chargeback summary for a time period
   X Exit
```

Cancellation summary

This report is used to see which users most frequently have their QMF queries canceled. High rates of cancellation may indicate that the user needs more training or that the user may need to be given greater resource privileges. High cancellation rates can often lead to end user dissatisfaction and should be investigated and discussed with the end user. The Cancellation Detail For a User report provides more specific cancellation information for a single user. The following is an online example of this report:

```
  RAAMR01T ------------------------ LINE 0000000 -- COLUMNS 001   080
  COMMAND ===>                                          SCROLL ===> PAGE
************************* TOP OF REPORT ****************************
                        QMF USERS
                  NUMBER OF TIMES CANCELED
                  SORTED IN DESCENDING ORDER

  CURRENT          NUMBER OF TIMES    FIRST DATE  LAST DATE
  SQLID    TSO ID     CANCELED         CANCELED   CANCELED
  --------  --------  ---------------  ----------  ----------
  DBPUSR   DBPUSR                12    1996-10-05  1996-10-24
  TSOP100  TSOP100               10    1996-10-05  1996-10-10

************************* BOTTOM OF REPORT *************************
```

Input variables

This report requires no input variables.

How to run this report online

You can invoke this report by selecting option 1 from the Object Manager Reports Selection Menu.

How to run this report in batch

Edit the sample JCL member RAAMR01J in QMFHPO.SRAASAMP. See the comments in this JCL member for instructions on what modifications are necessary before submitting the batch job.

Cancellation detail for a user

This report provides details on the queries that were canceled for a specific user, including the query name, SQL text, and reason for cancellation. The following is an online example of this report:

```
  RAAMR02T ------------------------- LINE 0000000 -- COLUMNS 031 079
  COMMAND ===>                                       SCROLL ===> PAGE
************************** TOP OF REPORT  **************************
  QMF CANCELLATION DETAILS      |
  FOR TSOID: DBPUSR             |
                                |
  QUERY     QUERY               |
  OWNER     NAME                |  DATE       TIME    REASON FOR CANCEL
  --------- ---------------     |  ---------- ------  -----------------
  DBPUSR    RUNAWAY             |  1996-10-24 06.17.48 QUERY ANALYZER CANCELED
  TSOP02    GOVDEMO             |  1996-10-24 06.15.59 ROW LIMIT EXCEEDED
  APP1XPL   TEST_APPQ           |  1996-10-24 06.18.31 ROW LIMIT EXCEEDED
  XPRT12D5  QUERY_LOC           |  1996-10-05 11.53.41 MONITOR CANCELED

******************** BOTTOM OF REPORT ******************************
```

Input variables

This report requires the following input variable:

TSOID
> Enter the TSO ID for which you want to obtain cancellation detail information.

How to run this report online

You can invoke this report by selecting option 2 from the Object Manager Reports Selection Menu.

How to run this report in batch

Edit the sample JCL member RAAMR02J in QMFHPO.SRAASAMP. See the comments in this JCL member for instructions on what modifications are necessary before submitting the batch job.

Performance summary based on maximum CPU

This report shows performance data for queries including their maximum CPU time consumed and number of times run. It is sorted in descending order to highlight those queries with the largest CPU consumption. Queries that are frequently run and have high CPU time consumption are the best candidates for converting to static SQL programs with Program Generator as they present the greatest opportunities for cost savings. More information on a specific query's performance can be gathered from the Performance Detail For a Query report and the Resource Consumption Detail For a User report. The following is an online example of this report:

```
  RAAMR03T -------------------------- LINE 0000000 -- COLUMNS 031 079
  COMMAND ===>                                            SCROLL ===> PAGE
*************************** TOP OF REPORT ****************************
 QMF QUERIES                 |
 MAXIMUM CPU AND RUN COUNT   |
 SORTED BY CPU SECONDS (DESC)|

 QUERY     QUERY             |    MAXIMUM     NUMBER OF   DATE
 OWNER     NAME              | CPU (SECONDS) TIMES RUN  FIRST RUN
 --------  ----------------- | ------------- --------- ---------
 DBPUSR    Q2Q11             |    37.28         14      1996-10-05
 USER01    RUNAWAY           |    33.31          2      1996-10-05
 USER01    GGVDEEO           |     4.24          5      1996-10-05
 USER01    QTEST506Q         |     0.34          4      1996-10-12
 USER01    QTEST504Q         |     0.32          8      1996-10-11
 USER01    QTEST507Q         |     0.32          2      1996-10-05
 TSOTEST1  XAAAR02Q          |     0.30          1      1996-10-19
 USER01    XAABR06Q          |     0.27          3      1996-10-20
 USER01    QTEST501Q         |     0.24          1      1996-10-21
 USER01    QTEST505Q         |     0.21          2      1996-10-21
 USER01    QTEST511Q         |     0.21          1      1996-10-21
 USER01    QTEST502Q         |     0.19          2      1996-10-21
```

Input variables

This report requires no input variables.

How to run this report online

You can invoke this report by selecting option 3 from the Object Manager
Reports Selection Menu.

How to run this report in batch

Edit the sample JCL member RAAMR03J in QMFHPO.SRAASAMP. See the
comments in this JCL member for instructions on what modifications are
necessary before submitting the batch job.

Performance summary based on average CPU

This report shows performance data for queries including their average CPU
time consumed and number of times run. It is sorted in descending order to
highlight those queries with the largest CPU consumption. Queries that are
frequently run and have high average CPU time consumption are the best
candidates for converting to static SQL programs with Program Generator as
they present the greatest opportunities for cost savings. More information on a
specific query's performance can be gathered from the Performance Detail for
a Query report and the Resource Consumption Detail for a User report. The
following is an online example of this report:

```
   RAAMR04T ----------------------------------- LINE 0000000 -- COLUMNS 031 079
   COMMAND ===>                                              SCROLL ===> PAGE
****************************** TOP OF REPORT  *******************************
   QMF QUERIES                   |
   AVERAGE CPU AND RUN COUNT     |
   SORTED BY CPU SECONDS (DESC)  |
                                 |
                                 |
   QUERY     QUERY               |   AVERAGE      NUMBER OF        DATE
   OWNER     NAME                | CPU (SECONDS)  TIMES RUN      FIRST RUN
   -------   ---------------     | -------------- --------------- ----------
   USER01    RUNAWAY             |       27.63              2   1996-10-05
   DBPUSR    XKQ1                |       12.46             14   1996-10-05
   USER01    XENDH               |        5.83              2   1996-10-05
   USER01    GGVEEMO             |        1.11              5   1996-10-05
   TSO01P    XAAAR02Q            |        0.30              1   1996-10-19
   USER01    QTEST507Q           |        0.28              2   1996-10-05
   USER01    QTEST501Q           |        0.24              1   1996-10-21
   XND1XY    XAAAR06Q            |        0.22              3   1996-10-20
   USER01    XAAAR011Q           |        0.21              1   1996-10-21
   USER01    QTEST505Q           |        0.21              2   1996-10-21
   USER01    QTEST502Q           |        0.19              2   1996-10-21
   XND1XY    QTEST505Q           |        0.19              1   1996-10-19
   USER01    QTEST506Q           |        0.14              4   1996-10-12
```

Input variables

This report requires no input variables.

How to run this report online

You can invoke this report by selecting option 4 from the Object Manager
Reports Selection Menu.

How to run this report in batch

Edit the sample JCL member RAAMR04J in QMFHPO.SRAASAMP. See the
comments in this JCL member for instructions on what modifications are
necessary before submitting the batch job.

Performance summary for a query

This report shows which users most often execute a specific query and the
CPU time that it consumes. It can be used once a problem query is identified
to determine which users are most frequently executing that query. The
following is an online example of this report.

```
RAAMR05T ------------------------------------- LINE 0000000 -- COLUMNS 001 080
COMMAND ===>                                                   SCROLL ===> PAGE
******************************* TOP OF REPORT ********************************
                        QMF RESOURCE USAGE BY USER
                         FOR QUERY USER01.XDEVTST


TSOID      SQLID     RUN COUNT    TOTAL CPU TIME
--------   --------   -----------  ------------------
USER01     USER01              2               55.26

***************************** BOTTOM OF REPORT ******************************
```

Input variables

This report requires the following input variables:

Query Owner

> Enter the owner of the query for which you want to obtain
> performance information.

Query Name

> Enter the name of the query for which you want to obtain
> performance information.

How to run this report online

You can invoke this report by selecting option 5 from the Object Manager
Reports Selection Menu.

How to run this report in batch

Edit the sample JCL member RAAMR05J in QMFHPO.SRAASAMP. See the
comments in this JCL member for instructions on what modifications are
necessary before submitting the batch job.

Performance detail for a query

This report shows detail statistics for each execution of a query. It provides
performance information such as CPU time consumed and rows fetched for
each execution and an average CPU time consumed in seconds for all
executions. The following is an online example of this report:

```
   RAAMR06T ------------------------------------- LINE 0000000 -- COLUMNS 001 080
   COMMAND ===>                                              SCROLL ===> PAGE

******************************* TOP OF REPORT *********************************
   QMF RESOURCE STATISTICS
   FOR QUERY USER01.XDEVTST


   TSOID    SQLID   CPU SECONDS   ROWS FETCHED   DATE         TIME       QUERY T
   -------  ------  ------------  -------------- ------       -----      -------
   USER01   USER01         33.31          16245 1996-10-05   11.53.41   SELECT
   USER01   USER01         21.95          10334 1996-10-05   10.41.04   SELECT

   AVERAGE CPU TIME FOR USER01.XDEVTST IS 27.63

****************************** BOTTOM OF REPORT *******************************
```

Input variables

This report requires the following input variables:

Query Owner
> Enter the owner of the query for which you want to obtain
> performance information.

Query Name
> Enter the name of the query for which you want to obtain
> performance information.

How to run this report online

You can invoke this report by selecting option 6 from the Object Manager
Reports Selection Menu.

How to run this report in batch

Edit the sample JCL member RAAMR06J in QMFHPO.SRAASAMP. See the
comments in this JCL member for instructions on what modifications are
necessary before submitting the batch job.

Resource consumption detail for a user

This report can be run for a specific user to determine which queries are
executed and the resources being consumed by those queries. The query
executions are sorted in descending order by CPU time consumed, which
highlights queries that are most important from a resource consumption
standpoint. It may point out that resource problems are limited to a few
specific queries, or that resource problems occur only when running ad hoc

queries. The report contains the actual query text at the time of execution. The following is an online example of this report:

```
  RAAMR07T ------------------------------------ LINE 0000000 -- COLUMNS 031 079
  COMMAND ===>                                                  SCROLL ===> PAGE
****************************** TOP OF REPORT  ********************************
  QMF RESOURCE STATISTICS|
  FOR TSOID: USER01      |
                         |
                         |
  QUERY    QUERY         |
  OWNER    NAME          | CPU SECONDS   ROWS FETCHED   DATE       TIME
  ------   -------       | ------------  ------------   --------   -----
  USER01   XDEVTST       | 33.31         16245          1996-10-05 11.53
  USER01   XDEVTST       | 21.95         10334          1996-10-05 10.41
  USER01   XENDH         | 9.16          988            1996-10-05 13.35
  USER01   GGVEEMO       | 4.24          2211           1996-10-24 06.13
  USER01   XENDH         | 2.50          102            1996-10-24 07.10
  USER01   GGVEEMO       | 0.39          401            1996-10-24 06.15
  USER01   GGVEEMO       | 0.39          401            1996-10-05 10.57
  USER01   GGVEEMO       | 0.37          401            1996-10-24 06.16
  USER01   QTEST507Q     | 0.32          4              1996-10-05 13.04
  USER01   QTEST507Q     | 0.24          4              1996-10-05 13.06
  USER01   QTEST501Q     | 0.24          2              1996-10-21 07.48
  USER01   QTEST511Q     | 0.21          14             1996-10-21 08.09
  USER01   QTEST505Q     | 0.21          4              1996-10-24 07.08
  USER01   QTEST505Q     | 0.20          3              1996-10-21 08.00
```

Input variables

This report requires the following input variable:

TSOID
> Enter the TSO ID for which you want to obtain resource consumption information.

How to run this report online

You can invoke this report by selecting option 7 from the Object Manager Reports Selection Menu.

How to run this report in batch

Edit the sample JCL member RAAMR07J in QMFHPO.SRAASAMP. See the comments in this JCL member for instructions on what modifications are necessary before submitting the batch job.

Resource usage summary

This report shows which users are most actively using QMF and consuming the most resources. The following is an online example of this report:

```
RAAMR08T ------------------------------------- LINE 0000000 -- COLUMNS 001 080
COMMAND ===>                                                   SCROLL ===> PAGE
****************************** TOP OF REPORT  ******************************
                       QMF RESOURCE USAGE BY USER

  TSOID     SQLID    RUN COUNT   TOTAL CPU    TIME
  --------  --------  -----------  ----------  -------
  DBPUSR    DBPUSR          36                 175.75
  USER01    USER01          32                  75.30
  XND1XY    XND1XY           9                   1.44
  TSO01P    TSO01P          12                   1.29

****************************** BOTTOM OF REPORT ******************************
```

Input variables

This report requires no input variables.

How to run this report online

You can invoke this report by selecting option 8 from the Object Manager Reports Selection Menu.

How to run this report in batch

Edit the sample JCL member RAAMR08J in QMFHPO.SRAASAMP. See the comments in this JCL member for instructions on what modifications are necessary before submitting the batch job.

Resource usage summary for a time period

This report shows which users are most actively using QMF and consuming the most resources during a specific period of time. Information on the report can be used for chargeback purpose, trend analysis, or problem identification. The following is an online example of this report:

```
   RAAMR09T ----------------------------------- LINE 0000000 -- COLUMNS 001 080
   COMMAND ===>                                                 SCROLL ===>PAGE
******************************** TOP OF REPORT  ********************************
                        QMF RESOURCE USAGE BY USER
                     FOR PERIOD 1996-10-01 TO 1996-10-31


   TSOID     SQLID    RUN COUNT    TOTAL CPU TIME     TOTAL ROW COUNT
   --------  -------- -----------  ------------------ ------------------
   DBPUSR    DBPUSR           36              175.75               92148
   USER01    USER01           32               75.30               31329
   XND1XY    XND1XY            9                1.44                  51
   TSO01P    TSO01P           12                1.29                  27

***************************** BOTTOM OF REPORT *******************************
```

Input variables

This report requires the following input variables:

Begin Date
> Enter the beginning date (in YYYY-MM-DD format) for which you
> want to obtain resource usage information.

End Date
> Enter the ending date (in YYYY-MM-DD format) for which you want
> to obtain resource usage information.

How to run this report online

You can invoke this report by selecting option 9 from the Object Manager
Reports Selection Menu.

How to run this report in batch

Edit the sample JCL member RAAMR09J in QMFHPO.SRAASAMP. See this
JCL for details on how to modify and run this report. See the comments in
this JCL member for instructions on what modifications are necessary before
submitting the batch job.

Chargeback summary for a time period

This report allows you to associate a cost with QMF usage for real or
informational chargeback purposes. It allows you to set a cost per unit for
CPU seconds consumed and rows fetched and then calculates a usage cost per
user for the specified time period. The following is an online example of this
report:

```
RAAMR10T ------------------------------ LINE 0000000 -- COLUMNS 001 080
COMMAND ===>                                          SCROLL ===> PAGE
*************************** TOP OF REPORT  ***************************
                      QMF RESOURCE USAGE BY USER
                  FOR PERIOD 1996-01-01 TO 1996-12-31
                    CPU COST $1.00  ROW COST $0.07

TSOID   SQLID  RUN COUNT   TOTAL CPU TIME  TOTAL ROW COUNT   TOTAL COST
-----   -----  ---------   --------------  ---------------   --------
DBPUSR  DBPUSR     36             175.75            92148     $6,626
USER01  USER01     32              75.30            31329     #2,268

************************** BOTTOM OF REPORT **************************
```

Input variables

This report requires the following input variables:

Begin Date
> Enter the beginning date (in YYYY-MM-DD format) for which you
> want to obtain resource usage information.

End Date
> Enter the ending date (in YYYY-MM-DD format) for which you want
> to obtain resource usage information.

Dollars per CPU
> Enter the amount (in DECIMAL(5,2) format) which represents the
> dollar per CPU second consumed cost.

Dollars per Row
> Enter the amount (in DECIMAL(5,2) format) which represents the
> dollar per row fetched cost.

How to run this report online

You can invoke this report by selecting option 10 from the Object Manager
Reports Selection Menu.

How to run this report in batch

Edit the sample JCL member RAAMR10J in QMFHPO.SRAASAMP. See the
comments in this JCL member for instructions on what modifications are
necessary before submitting the batch job.

Chapter 6. Governor

Governor defines a number of resources that can be governed during a QMF session. Examples of these resources are: access to a QMF session; types of sessions that can be started; types of QMF commands and SQL verbs that can be processed; the number of rows fetched by a query; and the amount of system resources consumed. Governor provides the necessary functions for QMF and DB2 database administrators to effectively manage, control, and restrict QMF resource usage.

The HPO/Governor Module provides Governor's direct interface into QMF processing.

You can review and manipulate QMF resource groups using the Governor online facility. The following actions are supported:
- Browsing a resource group
- Creating a resource group (optionally using another group as a model)
- Dropping a resource group
- Editing a resource group
- Assigning a resource group to a user profile
- Showing all control schedules for a resource group

Enabling QMF governing

To enable QMF governing, you must create a resource group and assign that resource group to your profile. This chapter describes how to do this. In addition, you must allocate QMFHPO.SRAALOAD to your TSO session and your CICS session. See "Step 4b. Special allocations for The HPO/Governor Module" on page 234 for more information about this allocation.

Creating a resource group

You create resource groups using the Governor online facilities. This is where you define all thresholds and controls. One of the common controls is the **Activate Resource Group?** flag. The HPO/Governor Module will bypass resource limit checking for any resource group that is not active. In addition, one of the scheduled controls is the `Active?` flag. Again, The HPO/Governor Module will bypass any schedules within a resource group that are not active. Make sure that the desired resource group and schedules within that resource group are active.

Assigning a resource group to a user profile

A resource group has no effect unless it is assigned to at least one user profile. QMF users are each mapped to a user profile, either through their TSO logon ID, their DB2 primary authorization ID, or through QMF open enrollment. By assigning a resource group to a user profile, you are setting limits and options for all users who map into that profile entry.

Resource groups

A resource group is a set of related controls that restrict when a QMF session can begin, what type of session can be started, what types of QMF commands and SQL verbs can be processed, and the amount of system resources that can be consumed. For example, a resource group may (among other things) restrict the number of fetched rows to 500 and prohibit the use of the SAVE DATA command.

Governor supports two types of controls in a resource group:
- Common
- Scheduled

Common controls are common to the entire resource group. Scheduled controls pertain to a specific date, day of the week, and time of day. For example, a QMF session that starts at 10 p.m. on a weekday will be controlled by the scheduled controls that are in effect at 10 p.m. on a weekday. Some controls are both common and scheduled. If so, the scheduled control will override the common control if the common control is enabled. Governor supports up to 255 schedules per resource group. Within each schedule, online controls can be set separately from batch controls.

With Governor, you have the flexibility to control QMF resource consumption by user, by date, by day of the-week, by time of day, and by mode of access (online or batch).

Resource groups are stored in the native QMF table named Q.RESOURCE_TABLE . A view named Q.RESOURCE_VIEW must be defined on this table because QMF accesses that view, not the table. For a detailed discussion of this table and view, and their columns and data types, see *Managing QMF for MVS.*

Resource group common controls

The following common controls pertain to an entire resource group:

Description
Although this field is not actually a control (no actions are taken due

to the value supplied), it allows you to record a description about this resource group. The maximum length is 40 characters.

Activate Resource Group?
> This flag controls whether or not this entire resource group is active. Its value must be either Y (to activate or enable) or N (to deactivate or disable). When a resource group is disabled, all control schedules are disabled. When a resource group is enabled, only those control schedules that are active are enabled.

Log Resource Violations?
> This flag controls the logging that Governor will perform when a resource violation occurs. If it is set to Q, a message will be logged to the user's DSQDEBUG data set. If it is set to R, a message will be logged to the user's RAADEBUG data set. If it is set to B, messages will be logged to both data sets. If it is set to N, no messages will be logged.

Asynchronous Timer Interval
> There are some scheduled controls that are governed asynchronously. Specifically, CPU and row limits are governed at distinct intervals while QMF is processing commands. The interval at which these controls are checked is specified in this option (in wall-clock seconds). If this value is 0, asynchronous governing is disabled. (CPU time limits are only checked asynchronously, so a value of 0 in this field effectively disables CPU time limit checking.)

REXX Program Name
> If you are not using Query Analyzer, this field is ignored. If you are using Query Analyzer, then you can optionally specify the name of an exit routine that Query Analyzer should invoke. If you leave this field blank, then it will default to the sample exit routine named RAARXQA. If you have written your own exit routine, specify the name here. See "Sample exit routine" on page 183 for a more detailed discussion.

Plan Table Owner/Current SQLID
> If you are not using Query Analyzer, this field is ignored. If you are using Query Analyzer, then you can optionally specify the CURRENT SQLID that Query Analyzer should use during query analysis. The value that you enter here will have two effects. First, this ID will become the owner of the PLAN_TABLE used for the EXPLAIN command issued by Query Analyzer. Second, it will become the owner of all unqualified tables in queries that are analyzed. Before setting this value, review the restrictions for setting CURRENT SQLID in *DB2 Administration Guide*.

Create Plan Table In Database
> If you are not using Query Analyzer, this field is ignored. Otherwise,

you can optionally specify the database in which Query Analyzer should create a PLAN_TABLE for a user if one does not already exist. If you leave this field blank and a PLAN_TABLE does not exist, query analysis will be bypassed.

Create Plan Table In Tablespace

If you are not using Query Analyzer, this field is ignored. Otherwise, you can optionally specify the tablespace in which Query Analyzer should create a PLAN_TABLE for a user if one does not already exist. You cannot enter a value in this field unless you also enter a value in the preceding **Create Plan In Database** field.

DB2 Subsystem ID for *

This field is used by The HPO/Governor Module under CICS and can be ignored if you are not planning to govern or track activity under QMF/CICS. Otherwise, if the location field is non-blank, then you must fill in the name of the DB2 subsystem ID that correlates to this location. If the location field is blank, the subsystem ID of the current DB2 will be used internally, but may be explicitly specified here as well.

Resource group scheduled controls

Scheduled controls are only active for the duration of a defined schedule. For example, if a schedule starts at 8 p.m. and stops after 5 p.m., then the associated controls will be in effect during those times and only those times. Governor supports up to 255 schedules per resource group, providing enough flexibility to properly control resource consumption.

All date, day, and time criteria are inclusive. For example, if the stop after time is 5 p.m., then the schedule will be active at 17:00:01, 17:00:02, through 17:00:59. The schedule will not be ignored until after 17:00:59.

As an administrator, you must define a value for each control. For each control, you can set online values separately from batch values. Again, this should provide enough flexibility to properly control both online resource consumption and batch resource consumption.

Prompt limits and cancel limits

If a cancel limit is exceeded, then The HPO/Governor Module cancels the current QMF command. If a prompt limit is exceeded (and the corresponding cancel limit is not exceeded), then a dialog begins with the user. This dialog explains what resource limit has been exceeded and asks the user for a response to one of these questions: should the current command continue running?; should it be canceled?; or should it continue through to completion and disable any further prompting? Notice that there is no batch prompt limit because it is not possible to invoke a dialog with the user in batch mode.

CPU time limits

Governor can control the amount of CPU time consumed for each distinct command. When a user issues a command, Governor begins to monitor CPU consumption. If a QMF command completes before the defined limits are exceeded, Governor resets its internal counters back to zero and waits for the next command to be issued.

Fetched row limits

Governor can control the number of rows fetched from the database for each distinct command. When a user issues a command, Governor begins to quantify fetched rows. If a QMF command completes before the defined limits are exceeded, Governor resets its internal counters back to zero and waits for the next command to be issued.

However, a command such as RUN can be followed by a series of related commands (for example, DOWN). When related commands are detected, these internal counters will not be reset back to zero. Instead these related commands are treated as extensions of the primary command.

To understand how Governor behaves, consider a scenario in which a user issues a RUN QUERY command. Assume that you want to limit the number of fetched rows to 1000. When the RUN command is issued, QMF fetches rows from the database until it is ready to display the first screen of data. Once the screen is displayed to the user the RUN command ends. When the user presses PF8 to view the next panel of data, a new command is issued, namely the DOWN command. As the user repeatedly presses PF8 and proceeds down the table, QMF will access more and more rows from the database.

Governor limits the number of fetched rows from the beginning of the primary command (RUN) until the end of the last related command (DOWN). That is, when related commands are detected, internal counters tracking the number of fetched rows will not be reset back to zero. Using the scenario above, the limit of 1000 will not be reached until the sum of rows fetched from the RUN command and subsequent DOWN commands exceeds 1000.

Schedule definitions (date, day of the week, time of day)

You can define up to 255 schedules per resource group. The first schedule whose date, day, and time definition matches the current date, day, and time will become the active schedule. Schedules are always checked in numerical order. That is, schedule 1 is checked first, schedule 2 is checked second, and so on (schedule 255 is checked last). The priority of checking to determine which set of controls is active is defined below:

1. **Start and Stop Date**

   If the current date is within this specified range, then the day field is checked next.

2. **Start and Stop Day**

   If the current day is within this specified range, then the time field is checked next.

3. **Start and Stop Time**

   If the current time is within this specified range, then this schedule's controls are in effect.

All ranges are inclusive, so that if the Start Date is 19970101, then the schedule would become active after midnight on 19961231. The order of checking is Date followed by Day Of The Week followed by Time Of Day. Therefore, if the Day does not coincide with the Date, the schedule will never be in effect.

If Start and Stop Times wrap around midnight (for example, 5 p.m. through 8 a.m.), this creates, in effect, two separate blocks of time each day that the schedule becomes active. Consider the following schedule as an example:

Start Date:	19970111 (January 11, 1997)
Stop Date:	19970131 (January 31, 1997)
Start Day:	2 (Monday)
Stop Day:	6 (Friday)
Start Time:	1700 (5 p.m.)
Stop Time :	0800 (8 a.m.)

This schedule is active January 11, 1997 through January 31, 1997 only on weekdays (Mondays through Fridays). For each day that this schedule is active, it is in effect for the hours 5 p.m. to midnight, and midnight to 8 a.m.. For example, this schedule is active each Monday morning from midnight to 8 a.m., as well as each Monday evening from 5 p.m. to midnight.

Scheduled controls

These are the scheduled controls in a resource group:

Start and Stop Date

   These values specify the start and stop dates that this schedule should be active. The dates should be of the form YYYYMMDD and are inclusive.

Start and Stop Day

These values specify the start and stop days of the week that this schedule should be active. The days should be from 1 (Sunday) to 7 (Saturday) and are inclusive.

Start and Stop Time

These values specify the start and stop times that this schedule should be active. The times should be of the form HHMM and are inclusive.

Active?

This flag controls whether or not this resource group control schedule is active. Its value must be either Y (to activate or enable) or N (to deactivate or disable). If the entire resource group is disabled, all scheduled controls are disabled. If the resource group is enabled, this flag is used to determine whether or not this particular schedule is enabled.

Max CPU Seconds (Prompt Limit)

In an online QMF session, if the CPU time for a QMF command exceeds this limit, a prompt dialog will occur between the user and QMF. (The cancel limit will be checked before the prompt limit is checked.) CPU time checking is only performed asynchronously; it will effectively be disabled if the common control **Asynchronous Timer Interval** is set to 0.

Max CPU Seconds (Cancel Limit)

For either batch or online QMF, this value, expressed in CPU seconds, represents the maximum CPU time allowable for any command. If this value is exceeded, the command will be canceled. CPU time checking is only performed asynchronously; it will effectively be disabled if the common control **Asynchronous Timer Interval** is set to 0.

Max Rows Fetched (Prompt Limit)

In an online QMF session, if the rows fetched for a QMF command exceeds this limit, a prompt dialog will occur between the user and QMF. (The cancel limit will be checked before the prompt limit is checked.)

Max Rows Fetched (Cancel Limit)

For either batch or online QMF, this value represents the maximum number of rows that may be fetched per command. If this value is exceeded, the command will be canceled.

Allow GRANT, REVOKE SQL? Allow CREATE, ALTER, DROP SQL? Allow INSERT, DELETE, UPDATE SQL?

A value of Y for any of these fields enables or allows that type of SQL statement to be processed. A value of N disables or disallows that

type of SQL statement. If N is specified and the user attempts to process that type of SQL statement, the command will be canceled.

Allow TSO/CICS Command? Allow EXPORT Command? Allow IMPORT Command? Allow SAVE DATA Command? Allow CONNECT Command?
A value of Y for any of these fields enables or allows that type of QMF command to be processed. A value of N disables or disallows that type of QMF command. If N is specified and the user attempts to process that type of command, the command will be canceled.

Enable QMF Access?
A value of Y for this field allows access to QMF while the schedule is active. A value of N disallows access. You can enable access to online sessions independently of batch sessions.

Enable Query Analyzer?
A value of Y for this field causes Query Analyzer to automatically analyze all queries. A value of S allows selective analysis of queries. A value of N disables all query analysis. Query analysis can be performed only in online QMF sessions under TSO. See "Chapter 8. Query Analyzer" on page 175 for more information.

Starting Governor

You perform all resource group maintenance from the Governor panel , which you can access by selecting option 2 from the Manager Selection Menu, or by issuing the following TSO command:

```
CALL 'QMFHPO.SRAALOAD(RAAMAIN)' 'RM G'
```

```
  DB2P / DB2PLOCATION -- Governor --------------------------------------- 6.1.0
  COMMAND ===>

  Action.................. ===>

  Resource Group........... ===>

  Drop Confirmation? (Y/N).. ===>


  ------------------------------------------------------------------------------
  Valid Actions Are...
  A  Assign
  B  Browse
  C  Create
  D  Drop
  E  Edit
  L  Display Selection List
  R  Create Using Defaults
  S  Show Schedules
  ------------------------------------------------------------------------------
```

If you press Enter, all input fields will be processed. If any errors are detected
during input validation, the panel will be redisplayed with an error message.

If you press PF3, all input fields will be ignored and you will return to the
previous selection menu.

Building a selection list of resource groups

To build a selection list of resource groups from the Governor panel, you must
enter the following fields:

Action
> Enter L (for list).

Resource Group
> Enter the resource group to list. You can use % and _ as wildcard
> characters to list multiple groups.

Drop Confirmation?
> Enter Y to request drop confirmations or N to suppress them. This
> value will be carried forward to all actions performed from the
> selection list that will be produced.

Resource Group Selection List panel

When you enter L (for list) on the Governor panel, the Resource Group Selection List panel will be displayed. This panel will contain a list of all error log entries that matched the input criteria entered on the Governor panel.

```
DB2P ⁄ DB2PLOCATION -- Resource Group Selection List ------------ 6.1.0
COMMAND ===>                                          SCROLL ===> PAGE

Valid Actions Are...
A  Assign                   B  Browse
C  Create Like              D  Drop
E  Edit                     S  Show Schedules
------------   --------------------------------------------------------
Action         Resource Group   Description
------         ---------------   ----------------------------------
*************************** BOTTOM OF DATA ****************************
```

If you press Enter, all rows that you selected with an action code will be processed. After all selected rows are processed, the panel will be redisplayed with an informative message on each row (such as *CREATED or *NODROP). This message will appear in the space between the **Action** and `Resource Group` fields.

If you press PF3, all input fields will be ignored and you will return to the Governor panel

If you press PF8 or PF7, the panel will scroll forward or backward after all selected rows are processed.

Browsing a resource group

You can browse a resource group from a selection list or directly from the Governor panel.

Browsing directly

To browse a resource group entry from the Governor panel, you must enter the following fields:

Action
> Enter B (for browse).

Resource Group
> Enter the resource group to browse. No wildcard characters are allowed.

Browsing from a selection list

To browse a resource group entry from the Resource Group Selection List panel, you must enter the following field:

Action
> Enter B (for browse).

Browsing common controls

The Browse Resource Group panel displays the resource group common controls. You can also browse one or more resource group schedules from this panel.

```
DB2P ⁄ DB2PLOCATION -- Browse Resource Group --------------------------- 6.1.0
COMMAND ===>

Resource Group :

Description... :

Common Control Options:
   Activate Resource Group? (Y⁄N)....... :
   Log Resource Violations? (Q⁄R⁄B⁄N)... :
   Asynchronous Timer Interval.......... :          (in seconds)

Query Analyzer Options

   REXX Program Name.................... :
   Plan Table Owner⁄Current SQLID....... :
   Create Plan Table In Database........ :
   Create Plan Table In Tablespace...... :

DB2 Subsystem ID for DB2PLOCATION...... :

Schedule Number To Process.......... ===>        (0=none,1-255=sched num)
```

If you press Enter and the **Schedule Number To Process** field is **not** equal to zero, you will proceed to the next specified scheduled control panel.

If you press Enter and the **Schedule Number To Process** field is equal to zero, or if you press PF3, you will return to the previous panel.

The field on the panel is:

Schedule Number to Process
> Enter a number between 0 and 255. If you enter 0, then no schedules will be browsed. Otherwise, the value that you enter indicates the number of the first schedule to browse.

Browsing scheduled controls

The Browse Resource Group panel displays scheduled controls.

```
DB2P / DB2PLOCATION -- Browse Resource Group: GROUP1 -------------------- 6.1.0
COMMAND ===>
Schedule Number. : 1        Next Schedule Number to Process.. ===>
Start Date...... :          Stop Date... :      (YYYYMMDD)
Start Day....... :          Stop Day ... :      (1=SUN,2=MON,...)
Start Time...... :          Stop Time... :      (HHMM)
Active? (Y/N)... :

Max CPU Seconds (Prompt Limit)...........Online :
Max CPU Seconds (Cancel Limit)...........Online :          Batch :
Max Rows Fetched (Prompt Limit)..........Online :
Max Rows Fetched (Cancel Limit)..........Online :          Batch :
Allow GRANT,REVOKE SQL? (Y/N)............Online :          Batch :
Allow CREATE,ALTER,DROP SQL? (Y/N).......Online :          Batch :
Allow INSERT,UPDATE,DELETE SQL? (Y/N)....Online :          Batch :
Allow TSO/CICS Commands? (Y/N)...........Online :          Batch :
Allow EXPORT Command? (Y/N)..............Online :          Batch :
Allow IMPORT Command? (Y/N)..............Online :          Batch :
Allow SAVE DATA Command? (Y/N)...........Online :          Batch :
Allow CONNECT Command? (Y/N).............Online :          Batch :
Enable QMF Access? (Y/N).................Online :          Batch :
Enable Query Analyzer? (Y/S/N)...........Online :
```

If you press Enter and **Next Schedule Number To Process** is not equal to the current schedule number, you will browse the next specified schedule.

If you press Enter and **Next Schedule Number To Process** is equal to the current schedule number, or if you press PF3, you will return to the previous panel.

The field on the panel is:

Next Schedule Number to Process
> Enter a number between 1 and 255. Enter the same number as the currently displayed schedule to terminate the browse session. Otherwise, the value that you enter indicates the number of the next schedule to browse.

Creating a resource group

You can create a resource group from a selection list or you can create a resource group directly from the Governor panel.

Creating directly

To create a resource group from the Governor panel, you must enter the following fields:

Action
> Enter C (for create).

Resource Group
> Enter the resource group to create. The resource group must not already exist.

Creating from a selection list

To create a resource group from the Resource Group Selection List panel, you must enter the following field:

Action
> Enter C (for create). This action will be treated as a Create Like... The controls of the resource group selected with the action of C will be used as a model on the Create Resource Group panel.

Creating common controls

The Create Resource Group panel is used to create the resource group common controls. You can also create one or more resource group schedules from this panel.

```
DB2P ∕ DB2PLOCATION -- Create Resource Group -------------------------- 6.1.0
COMMAND ===>
Resource Group :
Description... :
Common Control Options:
   Activate Resource Group? (Y∕N)....... :
   Log Resource Violations? (Q∕R∕B∕N)... :
   Asynchronous Timer Interval.......... :         (in seconds)
Query Analyzer Options
   REXX Program Name.................... :
   Plan Table Owner∕Current SQLID....... :
   Create Plan Table In Database........ :
   Create Plan Table In Tablespace...... :
DB2 Subsystem ID for DB2PLOCATION...... :
Schedule Number To Process.......... ===>         (0=none,1-255=sched num)
```

If you press Enter, the common controls will be created. If the **Schedule Number To Process** field is greater than zero, you will proceed to the schedule creation panel. If the `Schedule Number To Process` field is equal to zero, you will return to the previous panel.

If you press PF3, you will return to the previous panel and these controls will be ignored. "Resource group common controls" on page 140 describes the values you can enter for the fields on this panel, with the exception of this field:

Schedule Number to Process
> Enter a number between 0 and 255. If you enter 0, then no schedules will be created. Otherwise, the value that you enter indicates the number of the first schedule to create.

Creating scheduled controls

You can create resource group schedules from the Create Resource Group panel. Up to 255 schedules can be created for each resource group.

```
DB2P / DB2PLOCATION -- Create Resource Group: GROUP1 -------------------- 6.1.0
COMMAND ===>
Schedule Number. : 1        Next Schedule Number to Process.. ===>
Start Date...... :          Stop Date... :        (YYYYMMDD)
Start Day....... :          Stop Day ... :        (1=SUN,2=MON,...)
Start Time...... :          Stop Time... :        (HHMM)
Active? (Y/N)... :

Max CPU Seconds (Prompt Limit)...........Online :
Max CPU Seconds (Cancel Limit)...........Online :           Batch :
Max Rows Fetched (Prompt Limit)..........Online :
Max Rows Fetched (Cancel Limit).........Online :           Batch :
Allow GRANT,REVOKE SQL? (Y/N)............Online :           Batch :
Allow CREATE,ALTER,DROP SQL? (Y/N).......Online :           Batch :
Allow INSERT,UPDATE,DELETE SQL? (Y/N)....Online :           Batch :
Allow TSO/CICS Commands? (Y/N)...........Online :           Batch :
Allow EXPORT Command? (Y/N)..............Online :           Batch :
Allow IMPORT Command? (Y/N)..............Online :           Batch :
Allow SAVE DATA Command? (Y/N)...........Online :           Batch :
Allow CONNECT Command? (Y/N).............Online :           Batch :
Enable QMF Access? (Y/N).................Online :           Batch :
Enable Query Analyzer? (Y/S/N)...........Online :
```

If you press Enter, the input data will be validated. If any errors are detected, the panel will be redisplayed with an error message. If all values are valid, then this schedule will be created. If the **Next Schedule Number To Process** field is equal to the current schedule number, the previous panel will be displayed. If the `Next Schedule Number To Process` field is set to a new schedule number, this panel will be displayed again, ready for you to create that new schedule.

If you press PF3, you will return to the next panel without creating this schedule. "Resource group scheduled controls" on page 142 describes the values you can enter for the fields on this panel, with the exception of these fields:

Schedule Number

This field indicates the number of the schedule that is being processed.

Next Schedule Number to Process

Enter a number between 1 and 255. Enter the same number as the currently displayed schedule to terminate the create session. Otherwise, the value that you enter indicates the number of the next schedule to create.

Creating a resource group using defaults

You can create a resource group using predefined system default values. Follow the procedures described in "Resource group scheduled controls" on page 142, but use an action of R instead of C. All of the panels will be initialized with default values instead of blanks and zeros.

Note: These defaults may not make sense for your installation to use in a production environment. You may find them useful if you want to quickly establish resource groups with predefined controls.

Default values for common controls

The predefined system default values include common (non-scheduled) control values that are used when creating a resource group.

Control	Value
Description	HPO DEFAULTS
Activate Resource Group?	Y
Log Resource Violations?	Q
Asynchronous Timer Interval	1 second

Default values for scheduled controls

The predefined system default values include scheduled control values that are used when creating one or more schedules in a resource group.

Control	Value
Schedule Number	1
Schedule Start Date	19920101
Schedule Stop Date	20461231
Schedule Start Day	1
Schedule Stop Day	7
Schedule Start Time	00:00
Schedule Stop Time	24:00
Active?	Y
Max CPU: Online Prompt Value	1
Max CPU: Online Cancel Value	3
Max CPU: Batch Cancel Value	5
Max Rows: Online Prompt Value	250

Max Rows: Online Cancel Value	500
Max Rows: Batch Cancel Value	1500
Enable GRANT/REVOKE SQL?	N (for both online and batch)
Enable CREATE/ALTER/DROP SQL?	N (for both online and batch)
Enable INSERT/UPDATE/DELETE SQL?	Y (for both online and batch)
Enable TSO/CICS Command?	N (for both online and batch)
Enable EXPORT Command?	N (for both online and batch)
Enable IMPORT Command?	N (for both online and batch)
Enable SAVE DATA Command?	N (for both online and batch)
Enable CONNECT Command?	N (for both online and batch)
Enable QMF Access?	Y (for both online and batch)
Enable Query Analyzer?	N

Editing a resource group

You can edit a resource group from a selection list or directly from the
Governor panel.

Editing directly

To edit a resource group entry from the Governor panel, you must enter the
following fields:

Action
 Enter E (for edit).

Resource Group
 Enter the resource group to edit. The resource group must already
 exist.

Editing from a selection list

To edit a resource group entry from the Resource Group Selection List panel,
you must enter the following field:

Action
 Enter E (for edit).

Editing common controls

The Edit Resource Group panel is used to edit the resource group common
controls. You can also edit one or more resource group schedules from this
panel.

```
DB2P ∕ DB2PLOCATION -- Edit Resource Group ---------------------------- 6.1.0
COMMAND ===>

Resource Group :

Description... :

Common Control Options:
   Activate Resource Group? (Y∕N)....... :
   Log Resource Violations? (Q∕R∕B∕N)... :
   Asynchronous Timer Interval.......... :        (in seconds)

Query Analyzer Options
   REXX Program Name................... :
   Plan Table Owner∕Current SQLID....... :
   Create Plan Table In Database........ :
   Create Plan Table In Tablespace...... :

DB2 Subsystem ID for DB2PLOCATION...... :

Schedule Number To Process.......... ===>        (0=none,1-255=sched num)
```

If you press Enter, the common control fields will be modified. If the
Schedule Number To Process field is **not** equal to zero, you will proceed to
the next panel. If the `Schedule Number To Process` field is equal to zero, you
will return to the previous panel.

If you press PF3, you will return to the previous panel and these controls will
be ignored.

"Resource Group Selection List panel" on page 148 describes the values you
can enter for the fields on this panel, with the exception of this field:

Schedule Number to Process
>   Enter a number between 0 and 255. If you enter 0, then no schedules
>   will be edited. Otherwise, the value that you enter indicates the
>   number of the first schedule to edit.

Editing scheduled controls

You can edit resource group schedules from the Edit Resource Group panel.

```
DB2P / DB2PLOCATION -- Edit Resource Group: GROUP1 --------------------- 6.1.0
COMMAND ===>

Schedule Number. : 1        Next Schedule Number to Process.. ===>
Start Date...... :          Stop Date... :          (YYYYMMDD)
Start Day....... :          Stop Day ... :          (1=SUN,2=MON,...)
Start Time...... :          Stop Time... :          (HHMM)
Active? (Y/N)... :

Max CPU Seconds (Prompt Limit)...........Online :
Max CPU Seconds (Cancel Limit)...........Online :          Batch :
Max Rows Fetched (Prompt Limit).........Online :
Max Rows Fetched (Cancel Limit).........Online :          Batch :
Allow GRANT,REVOKE SQL? (Y/N)............Online :          Batch :
Allow CREATE,ALTER,DROP SQL? (Y/N).......Online :          Batch :
Allow INSERT,UPDATE,DELETE SQL? (Y/N)....Online :          Batch :
Allow TSO/CICS Commands? (Y/N)...........Online :          Batch :
Allow EXPORT Command? (Y/N)..............Online :          Batch :
Allow IMPORT Command? (Y/N)..............Online :          Batch :
Allow SAVE DATA Command? (Y/N)...........Online :          Batch :
Allow CONNECT Command? (Y/N).............Online :          Batch :
Enable QMF Access? (Y/N).................Online :          Batch :
Enable Query Analyzer? (Y/S/N)...........Online :
```

If you press Enter, the input data will be validated. If any errors are detected, the panel will be redisplayed with an error message. If all values are valid, then this schedule will be modified. If the **Next Schedule Number To Process** field is kept equal to the current schedule number, the previous panel will be displayed. If the `Next Schedule Number To Process` field is set to another schedule number, this panel will be displayed again, ready for you to edit the next schedule.

If you type DELETE on the command line and press Enter, this schedule is deleted. The **Next Schedule Number To Process** field determines which panel is displayed next.

If you press PF3, you will return to the next panel without modifying this schedule.

"Resource group scheduled controls" on page 142 describes the values you can enter for the fields on this panel, with the exception of these fields:

Schedule Number
> This field indicates the number of the schedule that is being processed.

Next Schedule Number to Process
> Enter a number between 1 and 255. Enter the same number as the currently displayed schedule to terminate the edit session. Otherwise, the value that you enter indicates the number of the next schedule to edit.

Dropping a resource group

You can drop a resource group from a selection list or directly from the Governor panel.

Dropping directly

To drop a resource group from the Governor panel, you must enter the following fields:

Action
Enter D (for drop).

Resource Group
Enter the resource group to drop.

Drop Confirmation?
Enter Y to request a drop confirmation panel or N to suppress one.

Dropping from a selection list

To drop a resource group entry from the Resource Group Selection List panel, you must enter the following field:

Action
Enter D (for drop).

Resource Group Drop Confirmation panel

The resource group to be dropped, along with the number of database rows that will be deleted as a result of this drop command, is displayed on the Resource Group Drop Confirmation panel.

```
DB2P ∕ DB2PLOCATION -- Resource Group Drop Confirmation ---------------- 6.1.0
COMMAND ===>

Press ENTER to confirm this DROP request.
Type CAN or CANCEL or press PF3 to cancel this DROP request.

Resource Group :
Description... :

This resource group is currently assigned to        user profile(s).

Number of rows to be deleted from Q.RESOURCE_TABLE :
```

If you press Enter, the resource group identified on the panel will be dropped from the database.

If you press PF3, this drop command will be ignored and the resource group will remain in the database.

Assigning a resource group to a user profile

Assignments of resource groups to user profiles are performed from a selection list. Once you choose the assignment action from the Governor panel or from the Resource Group Selection List panel, you must then set up a user profile selection list.

Assigning directly

To choose a resource group which will be assigned to one or more user profiles from the Governor panel, you must enter the following fields:

Action
      Enter A (for assign).

Resource Group
      Enter the resource group name.

Assigning from a selection list

To choose a resource group which will be assigned to one or more user profiles from the Resource Group Selection List panel, you must enter the following field:

Action
> Enter A (for assign).

Resource Group Assignment panel 1 of 2

This Resource Group Assignment panel is the first of two assignment panels that will be displayed.

```
DB2P / DB2PLOCATION -- Resource Group Assignment ----------------------- 6.1.0
COMMAND ===>

Resource Group..... :
    Description..... :

Creator........ ===>
Translation..... ===>
Environment..... ===>

Selection Filter ===>

--------------------------------------------------------------------------
Use this panel to build a selection-list of User Profiles.

Selection Filter = 1 will build a list of all User Profiles like...

Selection Filter = 2 will build a list of all User Profiles

                     already assigned to this Resource Group like...
```

If you press Enter, a selection list will be built using the qualifying user profiles that you entered.

If you press PF3, this assignment will be bypassed and you will return to the previous panel.

The fields on the panel are:

Creator
> Enter the creator field for the user profile. You can use % and _ as wildcard characters in the creator to select multiple user profiles.

Translation
> Enter the translation field for the user profile. You can use % and _ as wildcard characters in the translation to select multiple user profiles.

Environment

Enter the environment field for the user profile, one of TSO, CICS, CICSMVS, CICSVSE, CMS, WINDOWS, or -. You can use % and _ as wildcard characters in the environment to select multiple user profiles. This field will not be displayed for QMF Version 2.

Selection Filter

Enter 1 if you want the user profile selection list to include all matching user profiles or 2 if you want the list to include only those matching user profiles that are already assigned to this resource group.

Resource Group Assignment panel 2 of 2

This Resource Group Assignment panel is the panel from which the assignments are processed.

```
DB2P / DB2PLOCATION -- Resource Group Assignment ----------------------- 6.1.0
COMMAND ===>                                              SCROLL ===> PAGE
Valid Actions are...
A --Assign Resource Group to User Profile
U --Unassign Resource Group from User Profile
Resource Group:
   Description:
Action          Creator   Translation       Environment  Assigned To...
------          --------   ----------------  -----------  ----------------



****************************** BOTTOM OF DATA ********************************
```

If you press Enter, the selected assignments will be processed and the database will be updated. Because a resource group can be assigned to multiple user profiles, you will remain on this panel until you press PF3.

If you press PF3, any pending assignments will be bypassed and you will return to the previous panel.

Show schedules for a resource group

You can display all currently defined schedules for a resource group from a selection list or directly from the Governor panel.

Showing schedules directly

To show schedules for a resource group from the Governor panel, you must enter the following fields:

Action
> Enter S (for show schedules).

Resource Group
> Enter the resource group that you want to show.

Showing schedules from a selection list

To show schedules for a resource group entry from the Resource Group Selection List panel, you must enter the following field:

Action
> Enter S (for show schedules).

Resource Group Schedule List panel

The resource group schedule definitions will be displayed in schedule number order on the Resource Group Schedule List panel.

```
DB2P ╱ DB2PLOCATION -- Schedule List For GROUP1 ------------------------ 6.1.0
COMMAND ===>                                              SCROLL ===> PAGE
  Schedule Schedule Start    Stop     Start     Stop      Start Stop
  Number   Active?  Date     Date     Day       Day       Time  Time

  -------- -------- -------- -------- --------- --------- ----- -----
******************************* BOTTOM OF DATA ********************************
```

If you press PF7 or PF8, the panel will scroll backward or forward.

To return to the previous panel, press PF3.

Online display of current limits from QMF (RLIMITS)

While in QMF, a user can review the resource group scheduled limits and controls that are currently in effect by issuing the RLIMITS command from the QMF command line. To operate properly, the RLIMITS command synonym must be installed as described in "Step 2b. Create Manager command synonyms" on page 232."

When the RLIMITS command is issued, this panel is displayed.

```
DB2P -- Current Active Governor Schedule ------------------------------- 6.1.0
COMMAND ===>

Resource Group :
Start Date.... :            Stop Date.... :          (YYYYMMDD)
Start Day..... :            Stop Day..... :          (1=SUN,2=MON,...)
Start Time.... :            Stop Time.... :          (HHMM)
Active?....... :

Max CPU Seconds (Prompt Limit)........Online :
Max CPU Seconds (Cancel Limit)........Online :            Batch :
Max Rows Fetched (Prompt Limit).......Online :
Max Rows Fetched (Cancel Limit).......Online :            Batch :
Allow GRANT,REVOKE SQL? (Y⁄N).........Online :            Batch :
Allow CREATE,ALTER,DROP SQL? (Y⁄N)....Online :            Batch :
Allow INSERT,UPDATE,DELETE SQL? (Y⁄N).Online :            Batch :
Allow TSO⁄CICS Commands? (Y⁄N)........Online :            Batch :
Allow EXPORT Command? (Y⁄N)...........Online :            Batch :
Allow IMPORT Command? (Y⁄N)...........Online :            Batch :
Allow SAVE DATA Command? (Y⁄N).......Online :            Batch :
Allow CONNECT Command? (Y⁄N).........Online :            Batch :
Enable QMF Access? (Y⁄N).............Online :            Batch :
Enable Query Analyzer? (Y⁄S⁄N)......Online :
```

To return to the previous QMF panel, press Enter.

The HPO⁄Governor Module Help Panel

Whenever a QMF command is canceled, a message is displayed on the QMF panel message line. This message explains why the command was canceled, for example:

RAAG006E--Not authorized to process this QMF command: SAVE DATA

If you want to provide your QMF users with additional information regarding what to do when one of their QMF commands is canceled, you can enable The HPO⁄Governor Module Help Panel. If enabled, this panel will be displayed when a user enters the HELP command after their QMF command is canceled. This panel, named RAAQMFH , can be customized to contain any

desired information. For example, it can inform end users of a help desk phone number that should be called for questions related to QMF command cancellation.

Note: For detailed instructions on enabling this feature, see "Step 12f. Set The HPO/Governor Module configuration parameters" on page 245.

Chapter 7. Monitor

You can view QMF session activity in real time with Monitor. You can monitor who is currently using QMF, what types of actions are being performed, CPU time utilization and number of rows fetched for any action requiring database activity, and even view the SQL text associated with a long running query.

The following actions are supported from the Monitor online facility:

- Listing QMF sessions
- Browsing detail session activity
- Browsing SQL text
- Canceling current activity
- Generating VSAM file cleanup JCL

The HPO/Governor Module provides Monitor's direct interface into QMF processing.

Note: This facility can only be activated for QMF/TSO sessions.

Enabling QMF monitoring

To enable QMF monitoring, you must allocate QMFHPO.SRAALOAD to your TSO session. "Step 4b. Special allocations for The HPO/Governor Module" on page 234.for more information about this allocation. In addition, you must create the Monitor VSAM file (see ""Step 3. Create Monitor VSAM file" on page 232.), and specify its name to the HPO Configuration Dialog (see "Step 12f. Set The HPO/Governor Module configuration parameters" on page 245).

Starting Monitor

You start the Monitor online facility by selecting option 3 from the Manager Selection Menu, or by issuing the following TSO command:

```
CALL 'QMFHPO.SRAALOAD(RAAMAIN)' 'MN'
```

Note: If you attempt to invoke the Monitor online facility while you have a QMF session active, you will receive an error indicating a dynamic allocation failure.

```
QMF HPO⁄-Manager -- Monitor Selection Menu ----------------------------- 6.1.0
ENTER SELECTION ===>

                                               DB2 ID   ===> DB2P

                                               User ID:
                                                 Date:
                                                 Time:
-------------------------------------------------------------------------------

      1  List QMF Sessions
      2  VSAM File Cleanup JCL
      D  Set Default Parameters
      X  Exit
```

Viewing the QMF session list

The Monitor online facility allows you to generate a list of QMF sessions. Both current and previous sessions can be included in the list. The list displays the session user, the start date and time, and if the session has terminated, the stop date and time.

When you select option 1 from the Monitor Selection Menu, the QMF Session List panel is displayed. You can also invoke this panel by issuing the following TSO command:

CALL 'QMFHPO.SRAALOAD(RAAMAIN)' 'MN 1'

Those sessions that match the default parameter values will be displayed.

```
DB2P -- QMF Session List ------------------------------------------------ 6.1.0
COMMAND ===>                                                   SCROLL ===> PAGE

Valid Actions Are...
B  Browse Detail Activity for a Session


                              --Session Start--   ---Session End---
Act  TSOID    Mode           Date     Time       Date     Time
---  -------- --------       -------- --------    -------- --------

****************************** BOTTOM OF DATA *******************************
```

If you press Enter, the screen will be refreshed and the QMF sessions
displayed will be current to the present time.

If you press PF3, you will return to the Monitor Selection Menu.

The fields on the panel are:

Act (Action)
> Enter a B to view all of the detail activity for this session. This is the
> only input field on the panel.

TSOID
> For online sessions, this field displays the TSOID of the user who
> logged on to QMF. For batch sessions, this field displays the user ID
> associated with the batch job.

Mode   This field displays the mode of the session, either ONLINE or BATCH.

Session Start Date and Time
> This field displays the start date and time for the QMF session.

Session End Date and Time
> This field displays the end date and time for the QMF session. If this
> field is blank, then either the session is still active or it abnormally
> terminated.

Viewing the session activity list

Within a session, you can see every QMF command that is being issued by the user. For actions that cause database activity, the number of rows fetched and the CPU time consumption is also displayed.

When you enter a B next to an entry on the QMF Session List panel and press Enter, the Session Activity List panel is displayed. This panel displays all of the detail activity being performed in the user's QMF session.

```
DB2P -- Session Activity List ------------------------------------------ 6.1.0
COMMAND ===>                                              SCROLL ===> PAGE

Valid Actions Are...
B  Browse SQL Text
C  Cancel Current Action

TSOID :
Mode  :                                                             C S
                 QMF Object  Object                                 A Q
A Date     Time     Act Owner   Name                Rows      CPU   N L
- -------- -------- --- -------- ----------------- ---------- ----------- - -

****************************** BOTTOM OF DATA ********************************
```

If you are displaying an active QMF session and you press Enter, the displayed data will be refreshed.

If you are displaying a QMF session that has ended and you press Enter, the displayed data will remain the same.

If you press PF3, you will return to the QMF Session List panel.

The fields on the panel are:

A (Action)
> You can enter B in this column to browse SQL text associated with a query, or C to cancel an active QMF command with database activity.

See "Viewing SQL text" on page 170, and "Canceling a QMF command" on page 171 for a complete description of these actions.

Date and Time
> The date and time that the command started is shown in these columns. If this entry indicates incremental database activity (that is, QMF Act is ***), the date and time will be the same as the corresponding entry for the command that initiated the database activity.

QMF Act
> The QMF action that was performed is shown in this column. Values that can appear here are:

BEG Start QMF session

END End QMF session

ERA ERASE command

CNV CONVERT command

PRI PRINT command

DIS DISPLAY command

EXP EXPORT command

IMP IMPORT command

SAV SAVE command

RUN RUN command

*** Incremental database activity

Object Owner
> The owner of the object against which the action is being performed is shown in this column.

Object Name
> The name of the object against which the action is being performed is shown in this column.

Rows The accumulated number of rows retrieved is shown in this column. It is valid only for entries indicating incremental database activity.

CPU The accumulated CPU time consumed is shown in this column. It is valid only for entries indicating incremental database activity.

CAN The cancel flag is shown in this column. See "Appendix H. The HPO/Governor Module cancel codes" on page 329 for more information on the values that can appear here.

SQL If a Y appears in this column, then SQL text is available for viewing. Otherwise, no SQL text is available.

Viewing SQL text

When you enter a B next to an entry on the Session Activity List panel and press Enter, the SQL Text Browse panel is displayed (if SQL text is available). This panel displays the actual SQL statement being executed.

```
DB2P -- SQL Text --------------------------------------------------------- 6.1.0
COMMAND ===>                                                  SCROLL ===> PAGE

Object :


Date       Time     TSOID    SQLID     Mode     Rows      CPU
---------- -------- -------- --------- ------ --------- -----------



--------------------------------------------------------------------------------
****************************** BOTTOM OF DATA ******************************
```

If you press Enter, no action is performed.

If you press PF3, you will return to the Session Activity List panel.

The fields on the panel are:

Date This field displays the date that the command that activated database activity began.

Time This field displays the time that the command that activated database activity began.

TSOID
For online sessions, this field displays the TSOID of the user who logged on to QMF. For batch sessions, it displays the user ID associated with the batch job.

SQLID
This field displays the CURRENT SQLID at the time the command was initiated.

Mode This field displays the mode in which the command was run, either ONLINE or BATCH.

Rows This field displays the accumulated number of rows fetched at the time the SQL text was captured for the query.

CPU This field displays the accumulated CPU time consumed at the time the SQL text was captured for the query.

Canceling a QMF command

In addition to browsing QMF session activity, you can use the Monitor online facility to cancel any command in progress. Incremental records are displayed that show the cumulative CPU time consumption and database rows fetched for the command. You can use this information to decide whether or not to cancel a command.

You can enter a line action of C (cancel) on the Session Activity List panel. The cancel action will only take effect if entered on the most recent incremental database activity row for an active QMF session. (Incremental database activity rows are indicated by a value of *** for QMF Act.) When you enter the cancel action, Monitor sends a message to The HPO/Governor Module, requesting that the command be canceled.

Setting default parameters

Monitor uses a collection of default parameter settings. These default settings are saved from session to session in your ISPF profile data set (under an application ID of RAAX). You can set these default parameters by selecting option D from the Monitor Selection Menu.

```
DB2P -- Set Default Parameters ----------------------------------------- 6.1.0
COMMAND ===>

Include QMF sessions that were started...
1.  By this TSOID (use * for LIKE)....... ===>
2.  On or since this date (YYYYMMDD)..... ===>          (TODAY for current date)
3a. On or since this time (HHMMSS)....... ===>          (TODAY for current time)
  b. If 3a. = TODAY, include sessions that
     were started this many hours ago (HH) ===>
```

If you press Enter, the default values specified will be saved.

If you press PF3, all input fields will be ignored and you will return to the Monitor Selection Menu.

The fields on the panel are:

Include QMF sessions that were started by this TSOID
Enter the TSOID to monitor. You can use * as a wildcard character in the TSOID to select a group of TSOIDs to monitor. For example, enter ABC* to monitor all TSOIDs that start with ABC.

Include QMF sessions that were started on or since this date
Enter a date of the form YYYYMMDD to select QMF sessions started on or after this date, or enter TODAY to select today's QMF sessions.

Include QMF sessions that were started on or since this time
Enter a time of the form HHMMSS to select QMF sessions started on or after this time (on the date specified), or TODAY to select today's QMF sessions. If you enter TODAY, you must specify a value in the following field.

If 3a. = TODAY, include sessions that were started this many hours ago
Enter a number from 00 to 24 to represent the number of hours back in time from the current time to include in the monitor display for session activity. If this number would result in a time earlier than midnight, then midnight is used. If the value for the previous field is not TODAY, this field is ignored.

Monitor VSAM file maintenance

Monitor obtains QMF session information from the Monitor VSAM file (which is written by The HPO/Governor Module). During normal usage, more and more data will be written to this file. The Monitor online facility can generate and submit JCL to clean up this file.

Note: If the Monitor VSAM file does fill up, Monitor will automatically stop recording QMF session information.

The required frequency of cleanup is related to the amount of QMF activity at your site and the space allocation of the VSAM file. Once the data in the file is purged, it is no longer available for display from the Monitor online facility. Therefore, if a daily purge is scheduled, data will only be available for the last 24 hours.

Selecting option 2 from the Monitor Selection Menu brings you to the VSAM
File Cleanup JCL panel . You can also invoke this panel by issuing the
following TSO command:

CALL 'QMFHPO.SRAALOAD(RAAMAIN)' 'MN 2'

This panel allows you to specify the information needed to create the JCL and
to run the cleanup batch job.

```
DB2P -- VSAM File Cleanup JCL ------------------------------------------- 6.1.0
COMMAND ===>

Press ENTER to build JCL.
Type CAN or CANCEL or press PF3 to cancel this request.

1. Monitor VSAM File.. ===>

2. Cleanup Parameter.. ===>    (1=Reinitialize entire file,
                                2=Keep records for today,
                                3=Keep records for last 7 days,
                                4=Keep records for last 30 days)

3. Job Cards...
     ===>
     ===>
     ===>
     ===>

4. Edit or Submit JCL? ===>   (E=Edit, S=Submit)
```

If you press Enter, all input fields will be validated. If any errors are detected
during input validation, the panel will be redisplayed with an error message.
Otherwise, JCL to run the cleanup job will be either edited or submitted.

If you press PF3, all input fields will be ignored and you will return to the
previous panel.

The fields on the panel are:

Cleanup Parameter
You can specify four different types of cleanup. Enter 1 to completely
reinitialize the file. Enter 2 to purge all records except today's. Enter 3
to purge all records except for the last seven days'. Enter 4 to purge
all records except for the last 30 days'.

Job Cards

Enter valid job cards for the job. At least one line must be entered.
Any lines specified will be used exactly as entered in the generated
JCL.

Edit or Submit JCL?

Enter E to edit the generated JCL or S to automatically submit it after
it is generated.

Chapter 8. Query Analyzer

Query Analyzer provides you with preemptive governing capabilities needed to automatically prohibit resource intensive or inefficient QMF queries from being processed by DB2. By providing you with a resource profile for your query that is more meaningful than the TIMERON value, you can make decisions on whether or not a query should run or be canceled before it runs.

Even though you can also use Query Analyzer outside of QMF to interpret a query's access path efficiency without running it, this facility is primarily designed to be a pre-emptive governor for QMF.

The primary components of Query Analyzer are access path reporting, historical QMF query statistics, and an exit routine to allow conditional processing of the query based on the above information. The HPO/Governor Module provides Query Analyzer's direct interface into QMF processing.

Note: This facility can only be activated for QMF/TSO sessions.

Access Path Reporting

Query Analyzer automatically generates the PLAN_TABLE information needed to explain the access path information for a query. Relevant fields of the plan table output are calculated and summarized into a concise report for display purposes. Additionally, this data may be used by the exit routine to prevent queries from running based on restrictions devised by your site.

Historical QMF Query Statistics

With the object tracking component of Object Manager in place, Query Analyzer can also provide accurate detailed historical data for queries that have previously run. The historical information (maximum, minimum, and average CPU time and rows fetched) can be used in conjunction with the access path data to further identify resource intensive queries.

Exit Routine

An exit point is taken after Query Analyzer has produced the raw analysis data. The analysis data is passed to the Query Analyzer exit routine (a REXX program named RAARXQA), where you can specify whether the query should run or be canceled.

This exit routine specifies which ISPF panel to display to the user. A pre-defined panel is (and associated help panels are) shipped with Query Analyzer, but you can create your own and direct it to be displayed instead.

Additionally, all tables found in the access path information are passed to this exit routine. This allows you to cancel queries based on the tables that are referenced and accessed.

The exit routine can also limit the number of rows that the query should return. This "Top-10" feature is used to tell QMF to return only the first n-rows of an answer set before the query runs.

Again, the exit routine provided uses the REXX language for easy programming and modification.

Enabling QMF query analysis

To enable query analysis, you must allocate QMFHPO.SRAALOAD to your TSO session. See "Step 4b. Special allocations for The HPO/Governor Module" on page 234 for more information about this allocation.

Creating a resource group

To activate query analysis for a QMF user, you must create a resource group using the Governor online facility that enables Query Analyzer. For that resource group to take effect, you must assign it to the QMF user's profile. For a detailed discussion of the Governor online facility, resource groups and their Query Analyzer options, and assigning resource groups to user profiles, see "Chapter 6. Governor" on page 139.

If you have used the Governor online facility to make query analysis **automatic** for a resource group, then as users issue RUN QUERY commands in QMF, the SQL to be executed is automatically analyzed.

If you have enabled Query Analyzer in **selective mode**, only those queries run with the RQA command synonym will be analyzed. RQA is a command synonym for the QMF RUN command, which directs Query Analyzer to analyze the associated query. See "Step 2b. Create Manager command synonyms" on page 232 for information about how to create this command synonym.

Starting Query Analyzer

You start the Query Analyzer online facility by selecting option 4 from the Manager Selection Menu, or by issuing the following TSO command:

```
CALL 'QMFHPO.SRAALOAD(RAAMAIN)' 'QA'
```

This is the Query Analyzer Selection Menu . This panel is not displayed from QMFæonly when running the Query Analyzer online facility.

```
QMF HPO⁄Manager — Query Analyzer Selection Menu ----------------------- 6.1.0
ENTER SELECTION ===>

                                            DB2 ID   ===> DB2P

                                            User ID:
                                            Date:
                                            Time:
  -----------------------------------------------------------------------------

    1  Analyze Query
    D  Set Default Parameters
    X  Exit
```

Analyzing queries from outside of QMF

Query Analyzer can be used to process queries outside of QMF, such as ad hoc queries, exported QMF queries, and SPUFI queries. Selecting option 1 from the Query Analyzer Selection Menu brings you to the Analyze Query panel . You can also invoke this panel by issuing the following TSO command:

```
CALL 'QMFHPO.SRAALOAD(RAAMAIN)' 'QA 1'
```

```
DB2P -- Analyze Query -------------------------------------------------- 6.1.0
COMMAND ===>

Press ENTER to analyze a query from one of the following input sources.
Type CAN or CANCEL or press PF3 to end.

1. Query Data Set ===>

2. Or Enter Ad Hoc Query Text Below===>
===>
===>
===>
===>
===>
===>
===>
===>
===>
===>
===>
```

If you press Enter, the specified query will be analyzed. If any errors are
detected, the panel will be redisplayed with an error message. Otherwise, the
analysis data will be passed to the exit routine identified on the Set Default
Parameters panel.

If you press PF3, all input fields will be ignored and you will return to the
Query Analyzer Selection Menu.

The fields on the panel are:

Query Data Set
> Enter the name of the data set or data set and member containing the
> query to be analyzed. The data set should contain only query text and
> QMF-style comments.

Enter Ad Hoc Query Text Below
> Enter an ad hoc query into the space provided.

Setting default parameters

Query Analyzer uses a collection of default parameter settings. These default
settings are saved from session to session in your ISPF profile data set (under
an application ID of RAAX). You can set these default parameters by selecting
option D from the Query Analyzer Selection Menu.

```
DB2P -- Set Default Parameters ----------------------------------------- 6.1.0
COMMAND ===>

1.  REXX Program Name............. ===>
2.  Plan Table Owner⁄Current SQLID ===>

Create Plan Table In
3a. Database..................... ===>
3b. Tablespace................... ===>
```

If you press Enter, all input fields will be validated. If any errors are detected
during input validation, the panel will be redisplayed with an error message.
If there are no errors, then these default values will be saved.

If you press PF3, all input fields will be ignored and you will return to the
Query Analyzer Selection Menu. The previous default values will be restored.

The fields on the panel are:

REXX Program Name
> This field is optional. If you leave this field blank, then the sample
> exit routine named RAARXQA will be used. If you have written your
> own exit routine, specify the name here.

Plan Table Owner⁄Current SQLID
> This field is optional. If a value is entered here, it will be used as the
> CURRENT SQLID during query analysis. The result of this is twofold.
> First, this ID will become the owner of the PLAN_TABLE used for the
> EXPLAIN command. Second, it will become the owner of all
> unqualified tables in FROM clauses. Before setting this value, review
> the restrictions for setting CURRENT SQLID in *DB2 Administration
> Guide*.

Create Plan Table In Database
> You can optionally specify the database in which Query Analyzer
> should create a PLAN_TABLE for a user if one does not already exist.
> If you leave this field blank and a PLAN_TABLE does not exist, query
> analysis will be bypassed.

Create Plan Table In Tablespace

You can optionally specify the tablespace in which Query Analyzer should create a PLAN_TABLE for a user if one does not already exist. You cannot enter a value in this field unless you also enter a value in the preceding **Create Plan Table In Database** field.

Analyzing queries with the edit macro

Queries can be analyzed outside of QMF using the Query Analyzer edit macro named RAAQA. While you are in an ISPF EDIT session, you can select a query from the edited data set and invoke Query Analyzer.

You can enter the name of the DB2 subsystem in which to analyze the query after the macro name. For example, to analyze a query in DB2 subsystem DB2T, type RAAQA DB2T on the command line.

Here is an example of how to invoke query analysis from an ISPF EDIT session.

```
EDIT ---- USERAPPL.SOURCE(QUERY1) -- 01.00 ------------------- COLUMNS 007 072
 COMMAND ===> RAAQA DB2T                                       SCROLL ===> CSR
 013700             DEPT              SMALLINT               ,
 013800             JOB               CHARACTER(5)           ,
 013900             YEARS             SMALLINT               ,
 014000             SALARY            DECIMAL(7,2)           ,
 014100             COMM              DECIMAL(7,2)
 014200         )
 014300     END-EXEC.
 014400 *
 014500     EXEC SQL
 014600     DECLARE C1 CURSOR FOR
 014700
 QQ          SELECT ID, NAME
 014900       FROM Q.STAFF
 QQ           WHERE COMM IS NOT NULL
 015100
 015200     END-EXEC.
 015300 *
 015400     EXEC SQL INCLUDE SQLCA END-EXEC.
 015500 *
 015600  01  SAVED-SQLCODE                 PIC S9(9) COMP.
 015700 *
```

If you type RAAQA or RAAQA ssid on the command line and press Enter, the selected query will be analyzed in the specified DB2 subsystem. If you do not specify a subsystem, the last subsystem specified will be used. If any errors are detected, the panel will be redisplayed with an error message. Otherwise, the analysis data will be passed to the exit routine.

The fields on the panel are:

Command

Type RAAQA or RAAQA ssid on the command line (where ssid is a valid DB2 subsystem ID).

Line Command:

Isolate or select the query by entering a Q on the line of code (or QQ for blocks of code) that contain the query. Only select the query; do not select any lines that contain EXEC SQL, DECLARE CURSOR FOR, or END-EXEC.

Exit routine

This section describes how the exit routine fits into the general processing flow. In addition, the sample exit routine and the sample analysis output panel (and associated help panels) are discussed. Read this entire section before attempting to use or modify the sample exit routine or before you write your own exit routine.

General processing flow

Step 1. RUN QUERY

RUN QUERY represents the beginning of the process. This could mean the user issued a RUN QUERY or RQA QUERY command from QMF. It could also mean that Query Analyzer was invoked from the online ISPF facility or from the edit macro. In the latter two cases, the query is never executed.

Step 2. Trap SQL

This step merely represents the isolation of the query prior to execution of the analysis phase. If the query is coming from QMF, then all substitution variables will have been replaced by now. If the query is coming from the online ISPF facility or the edit macro, host variables and substitution variables will be replaced internally by parameter markers (question marks) in this step.

Step 3. Run EXPLAIN

At this point, the query is processed using the EXPLAIN command. The result of this command is that access path information is inserted into a PLAN_TABLE. These PLAN_TABLE entries are read and stored internally in the program. Afterwards, these entries are deleted from the PLAN_TABLE.

The owner of the PLAN_TABLE into which these entries are inserted is determined by the user's CURRENT SQLID. You can override the CURRENT SQLID. That is, Query Analyzer can SET CURRENT SQLID before running

the EXPLAIN to control which PLAN_TABLE will be used. Once CURRENT SQLID is set, all unqualified tables within the query will now be qualified by CURRENT SQLID.

From QMF, CURRENT SQLID is obtained from the user's resource group. Use the Governor online facilities to set this field. From the online ISPF facility or from the edit macro, CURRENT SQLID is obtained from the Set Default Parameters panel.

If a PLAN_TABLE does not exist for the user (the CURRENT SQLID), then Query Analyzer will attempt to create one. The database and tablespace in which the PLAN_TABLE will be created is supplied to Query Analyzer either via the resource group definitions if the user is running under QMF, or via the value set on the Set Default Parameters if the user is running from the online ISPF facility. If these variables are left blank, then no analysis can be performed.

Step 4. Gather Access Path and Historical Data

Here all access path information is gathered and summarized. In addition, historical query statistics (CPU time and rows fetched) are summarized and made available to the exit routine. All table names found in the plan table output (a maximum of 10) are passed to the exit routine as well.

Step 5. Call Exit Routine

Once the access path information is gathered and summarized, the appropriate exit routine is called. The exit routine is responsible for setting three variables:
- PANELID
- CANFLG
- AAQARM

This first variable, PANELID, notifies Query Analyzer which panel, if any, should be displayed to the user after the query is analyzed. Any non-blank value is used as the name of the output panel.

The second variable, CANFLG, notifies Query Analyzer if it should cancel the QMF query. To cancel the query, set CANFLG to `CANCEL`. Any other value allows the query to continue.

If the exit routine specifies a panel name and has canceled the query, a message will be displayed on the output panel notifying the user that the query has been canceled. If the query was not canceled by the exit routine,

then the panel contains a cancellation prompt. If the user responds with a Y, then the CANFLG variable will be set to CANCEL by the output panel in it's processing section.

If the query is to be canceled (if CANFLG is set to CANCEL after all exit processing finishes), then Query Analyzer cancels the QMF query and notifies the user with a message on the QMF message line.

The third variable, AAQARM, is more of a resource controller than an analysis tool, but provides more user control over query execution. This field lets the user tell QMF how many rows to fetch before canceling the query. The default value is zero, which means no row limit is set here. If any other value is specified, that value will cause QMF to halt execution after reaching this row limit.

Step 6. PANELID Set?

Query Analyzer can display a panel to the user. The exit routine is responsible for notifying Query Analyzer which panel it should display by setting the ISPF variable named PANELID. To hide the analysis from the user, set PANELID to spaces. The sample exit sets PANELID to RAAQMFQA, the sample output panel.

Step 7. Display Analysis Output Panel

If the PANELID variable is set, then Query Analyzer displays the appropriate panel.

Step 8. Cancel Query?

Query Analyzer can cancel a QMF query. The exit routine is responsible for notifying Query Analyzer if the query should be canceled by setting the ISPF named CANFLG to CANCEL. (The sample output panel can also set CANFLG.)

Sample exit routine

The sample exit routine is named RAARXQA and performs several operations on the raw analysis data as received from the analysis engine. Refer to the comments within these exits for details on the processes and for a list of the incoming parameters, the names of the variables, and their meanings.

Set CANFLG variable

To cancel a query, simply set the variable named CANFLG to the character string CANCEL. Any other value allows the query to continue running. For example, if a table is being accessed at a time of day when it's restricted, the exit routine can set this flag (as stated above) to cancel the query.

To pass the variable value back to Query Analyzer, the exit routine must VPUT the variable into the shared variable pool.

```
ISPEXEC VPUT (CANFLG) SHARED
```

You could add your own threshold logic, such as, cancel a query if more than one table is accessed and no indexes are used.

Set AAQARM variable

Additionally, the exit routine may pass back the number of rows to fetch before canceling the query. This allows each user the ability to minimize resource consumption by limiting the number of rows fetched for each query. To pass the variable value back to Query Analyzer, the exit routine must also VPUT the variable into the shared variable pool.

```
ISPEXEC VPUT (AAQARM) SHARED
```

Set analysis output variables

The exit routine must VPUT all variables that will be displayed on the output panel. In the sample exit, the variables QAP1 through QAP29 are VPUT to the shared pool.

```
ISPEXEC VPUT (QAP1 , QAP2 , QAP3 , QAP4 , QAP5 ,
              QAP6 , QAP7 , QAP8 , QAP9 , QAP10,
              QAP11, QAP12, QAP13, QAP14, QAP15,
              QAP16, QAP17, QAP18, QAP19) SHARED
ISPEXEC VPUT (QAP20, QAP21, QAP22, QAP23, QAP24,
              QAP25, QAP26, QAP27, QAP28, QAP29) SHARED
```

Analysis output variables:

Variable	Description
QAP1	Number of Query blocks
QAP2	Number of Tables Referenced
QAP3	Join Methods
QAP4	Access Types
QAP5	Number of Index Only scans
QAP6	DB2 Sorting
QAP7	Parallelism Modes
QAP8	Highest Access Degree
QAP9	Number of Page Range Screens
QAP10	Join Types
QAP11	Prefetch Types
QAP12	Minimum row count

QAP13	Maximum row count
QAP14	Average row count
QAP15	Minimum CPU time
QAP16	Maximum CPU time
QAP17	Average CPU time
QAP18	Number of Matching Index scans
QAP19	Column Functions Evaluation Types
QAP20	Is access through an index?
QAP21	Is access through more than one index?
QAP22	How many indexes use matching columns?
QAP23	Is the query satisfied using only an index?
QAP24	Are scans limited to certain partitions?
QAP25	What kind of prefetching is done?
QAP26	Is data accessed/processed in parallel?
QAP27	Are sorts performed?
QAP28	Are joins present in query?
QAP29	When are column functions evaluated?

Description of analysis output

Before you run Query Analyzer using the sample exit routine or before you modify or create your own exit routine, you should be familiar with the analysis data that is provided to the exit routine. The sample output panel (and associated help panels) provided with Query Analyzer contain and describe all of these values, excluding the table names passed to the exit routine (which is described here).

Table creator/name
> The table creator and name for up to 10 tables found in the plan table are passed to RAARXQA. The exit routine can then act upon this information by canceling the query, displaying the table name, or any other appropriate action. These table names are accessed using the ISPF VGET command in the sample exit routine for the variables named T1, T2, ..., T10.

Sample analysis output panel

The QMF Query Information panel (RAAQMFQA) is described in this section. All of the data available from Query Analyzer is shown on this panel.

```
DB2P — QMF Query Information ---------------------------------------------- 6.1.0
COMMAND ===>


Is access through an index?................................ :
Is access through more than one index?..................... :
How many indexes use matching columns?..................... :
Is the query satisfied using only the index?............... :
Was a scan limited to certain partitions?.................. :
Is prefetching performed?.................................. :
Is data accessed/processed in parallel?.................... :
Are sorts performed?....................................... :
Are joins present in the query?............................ :
When are column functions evaluated?....................... :

Historical Data For This Query
Minimum rows...... :              Minimum CPU time......... :
Maximum rows...... :              Maximum CPU time......... :
Average rows...... :              Average CPU time......... :

Enter Y or press PF3 to cancel this query ===>
Enter maximum number of rows to fetch.... ===>            (0=bypass)
```

If you press PF1, a description of these fields and the raw access path data are
available for display.

The fields on the panel are:

Is access through an index?
> If an access type of I, I1, N, or MX is found in the EXPLAIN output,
> then this field is set to YES. This indicates at least one instance of
> index access, although other access types may also be present.

Is access through more than one index?
> If an access type of M, MX, MI, or MU is found in the EXPLAIN
> output, then this field is set to YES. This indicates at least one instance
> of a multiple index access.

How many indexes use matching columns?
> If index access is found in the plan and MATCHCOLS > 0, then this
> number is incremented by 1. This is not the number of matching
> columns per index nor is it the sum of the number of matching
> columns, but rather the number of index accesses wherein columns in
> a WHERE condition matched columns of the index. This is equal to
> the Matching Index scans field on the Help panel.

Is the query satisfied using only the index?
> If **any** query in the plan has an INDEXONLY column = YES, then this
> field will be set to YES.

Was a scan limited to certain partitions?
> If PAGE_RANGE = Y for any row in the plan table, then this field will be set to YES.

Is prefetching performed?
> If PREFETCH is L or S for any row of the plan table, then this field will be set to YES.

Is data accessed/processed in parallel?
> If PARALLELISM_MODE is I or C for any row in the plan table, then this field is set to YES.

Are sorts performed?
> If any of the SORTN_ or SORTC_ columns of the plan table are Y, then this field is set to YES. Also, if Join Method = 3, this also indicates a sort was performed.

Are joins present in the query?
> If METHOD = 1,2, or 4 for any row in the plan table, then this field is set to YES.

When are column functions evaluated?
> This value can be S and/or R according to COLUMN_FN_EVAL in the plan table. SQL Parsing is not performed to determine specific function type.

Historical data for query
> This area of the panel shows the actual historical values saved from previous runs of the named object. The object name and associated statistics will be displayed only if available. Because object history is tracked by QMF object name, queries run with no associated object name will not be able to access historical statistics. Given the case where the object has been tracked, the information shown is the minimum, maximum, and average counts for both rows fetched and CPU utilization (the CPU time shown is in HH:MM:SS:HS format).

Query will be canceled by Query Analyzer
> If the exit routine has determined that the query should be canceled, then this message will appear at the bottom of the panel:

Enter Y or press PF3 to cancel this query
> If you specify Y and press Enter or simply press PF3, this query will not run and you will return to the previous QMF panel. If you leave this field blank and press Enter, this query will run.

Enter maximum number of rows to fetch (0=bypass)
> This value determines the number of rows that QMF will fetch before the query is canceled. A value of 0 (zero) directs Query Analyzer to bypass this row limit checking. The value entered here will never override any row limit enforced by Governor.

Sample analysis help panel

The QMF Query Information Help panel (RAAQMFQB) is described in this section. All of the raw access path data available from Query Analyzer is shown on this panel. This panel is accessed from the QMF Query Information help facility.

```
DB2P — QMF Query Information Help - Access Path Details --------------- TUTORIAL
COMMAND ===>
Press ENTER for a description of these values.


Number of Query Blocks.................................... :
Number of Tables Referenced............................... :
Access Types.............................................. :
Number of Index Only Scans⁄Matching Index Scans........... :
Join Methods.............................................. :
Join Types................................................ :
Prefetch Types............................................ :
Number of Page Range Screens.............................. :
DB2 Sorting............................................... :
Parallelism Modes⁄Highest Access Degree................... :
Column Functions Evaluation Types......................... :
```

The fields on the panel are:

Number of Query Blocks
This is the highest number found in the QBLOCKNO column of the plan table. It represents the number of queries in the SQL statement.

Number of Tables Referenced
The total number of table names occurrences found in the plan table. An occurrence of a table name is a non-blank value in the TNAME column of the plan table. This column may contain a name of a table, view, table expression or temporary table. Duplicates will be counted as separate references. For a list of table names found in the plan table, see Table creator⁄name below).

Access Types
The different methods of accessing the tables found in the plan table. The values listed here are from the ACCESSTYPE column of the plan table. Duplicates are NOT shown.

Number of Index Only Scans/Matching Index Scans

The **number of index only scans** is a total number of occurrences of the value Y (Yes) in the INDEXONLY column of the plan table. This represents the number of steps within the plan that can be satisfied with an index read only (no data access necessary). If the Number of Query Blocks equals this number, then all queries in the statement are satisfied using an index only. The `number of matching index scans` represent the number of occurrences of the MATCHCOLS column where the value is greater than zero. It is not the actual number of columns matching on the index, but rather the number of times the index keys are used in an index scan.

Join Methods

A list of the different types of join methods found in the plan table. The values listed come directly from the METHOD column of the plan table. Duplicates are NOT included.

Join Types

A list of the different types of joins found in the plan table. The values listed come directly from the JOIN_TYPE column of the plan table. Only outer joins are listed (inner joins are blank) and a Left Outer join (L) is equivalent to a Right Outer join. Duplicates are NOT included.

Prefetch Types

A list of the different types of prefetch, if any, found in the plan table. If prefetching is possible, it will be either a sequential (S) prefetch or a list (L) prefetch as listed in the PREFETCH column of the plan table. Duplicates are NOT included.

Number of Page Range Screens

The total number of occurrences of tables that qualify for page range screening. For every value equal to Y (Yes) in the column PAGE_RANGE of the plan table, this number is incremented by one. The total Number of Page Range Screens found and the Number of Tables Referenced can be used to determine percentages of page range screening per table access within the query.

DB2 Sorting

This value is a Yes/No indication of whether any DB2 sorting was found in the plan table. A value of Y (Yes) for any of the SORTN_ or SORTC_ columns would trigger a Y indicator for this field.

Parallelism Modes/Highest Access Degree

Parallelism modes list the types of parallelism available at bind time. If a value of I or C (I/O or CPU parallelism) is found for any step in the plan in column PARALLELISM_MODE, then the highest access degree field can be non-zero. The highest access degree represents the greatest number of parallel tasks available for any step in the plan

table activated by the query. This is the highest value found in the ACCESS_DEGREE column of the plan table and does NOT include the JOIN_DEGREE value.

Column Functions Evaluation Types

A list of the different types of column function evaluations, if any, found in the plan table. The values can be either an S (function evaluated while performing a sort to satisfy a GROUP BY clause) or R (column function evaluated while data is being read). If NONE is listed, then function may be evaluated after data retrieval and any sorts, or if ACCESSTYPE = I1 and MIN or MAX function is present, at index access time. Duplicates are NOT included.

Restrictions

Query Analyzer restrictions are listed below.

- Only SELECT queries are currently handled. Other types of queries, such as INSERT, UPDATE, and DELETE are ignored.
- A maximum of 10 tables (creator and name) will be passed to the sample exit routine.
- Queries cannot be analyzed from QMF running under CICS.
- Queries cannot be analyzed from QMF running in batch.

Chapter 9. User Profile Facility

Every QMF user is required to have a user profile to start a QMF session. A user profile contains values that define attribute settings. Examples of user profile attributes are report dimensions (page length and page width).

Under QMF Version 2, a user profile is uniquely identified by the combination of creator and translation. Under QMF Version 3 and later, a user profile is uniquely identified by the combination of creator, translation, and environment.

Creator
> is usually a user's TSO logon ID, such as TSOU01.

Translation
> corresponds directly to the different language environments supported by QMF: ENGLISH, UPPERCASE, FRANCAIS CANADIEN, SIMPLIFIED CHINESE, T-CHINESE, DANSK, FRANCAIS, DEUTSCH, ITALIANO, NIHONGO, HANGEUL, PORTUGUES, ESPANOL, SVENSKA, FRANCAIS (SUISSE), and DEUTSCH (SCHWEIZ).

Environment
> can be either TSO, CICS, CICSMVS, CICSVSE, CMS, WINDOWS, or null. The User Profile Facility allows you to specify null for this field with a single dash (-).

Where a user profile is stored

User profiles are stored in your site's QMF user profile table. The name of this table is always Q.PROFILES . For a detailed discussion of this table, see *Managing QMF for MVS.*

Open and restricted enrollment

Every QMF user needs a user profile. Under restricted QMF enrollment, if a user profile with a matching creator does not exist, then the user cannot start a QMF session. With open QMF enrollment, if a user profile with a matching creator does not exist, then QMF will look for a user profile with a creator equal to SYSTEM . A session can begin only if a profile is found in one of these ways. With open enrollment in effect, every user has access to the SYSTEM profile, giving every user potential access to QMF.

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It is possible for a site to have both open and restricted enrollment at the same time. The hierarchy of searches is:

- Search for a restricted user profile row (matching creator)
- Search for the open user profile row (creator = SYSTEM)

For QMF Version 3 and later, environment as well as creator is used to identify a profile entry.

The User Profile Facility makes it easy for you to support full restricted enrollment. This will ultimately help you achieve better control over your QMF environment.

Displaying the User Profile panel

You perform all user profile maintenance from the User Profile panel, which you can access by selecting option 5 from the Manager Selection Menu, or by issuing the following TSO command:

```
CALL 'QMFHPO.SRAALOAD(RAAMAIN)' 'RM U'
```

```
DB2P / DB2PLOCATION -- User Profile ------------------------------------ 6.1.0
COMMAND ===>

Action................... ===>

Creator.................. ===>
Translation.............. ===>
Environment.............. ===>

Clean Up Objects? (Y/N)... ===>
Drop Confirmation? (Y/N).. ===>


--------------------------------------------------------------------------------
Valid Actions Are...
A  Assign
B  Browse
C  Create
D  Drop
E  Edit
G  Invoke Governor
L  Display Selection List
--------------------------------------------------------------------------------
```

If you press Enter, all input fields will be processed. If any errors are detected during input validation, the panel will be redisplayed with an error message.

If you press PF3, all input fields will be ignored and you will return to the previous menu.

Building a selection list of user profiles

To build a selection list of user profile entries from the User Profile panel, you must enter the following fields:

Action
> Enter L (for list).

Creator
> Enter the creator field for the user profile. You can use % and _ as wildcard characters in the creator to select multiple profile entries.

Translation
> Enter the translation field for the user profile. You can use % and _ as wildcard characters in the translation to select multiple profile entries. If you leave this field blank or enter *, the system default will be used.

Environment
> Enter the environment field for the user profile, one of TSO, CICS, CICSMVS, CICSVSE, CMS, WINDOWS, or -. You can use % and _ as wildcard characters in the environment to select multiple profile entries. This field will only be displayed for QMF Version 3 and later sites.

Clean Up Objects?
> Enter Y to automatically invoke Object Manager after a user profile is dropped. This allows you to clean up (drop, transfer, copy, or migrate) objects for the user that was just dropped. Enter N to disable this action.

Drop Confirmation?
> Enter Y to request drop confirmations or N to suppress them. This value will be carried forward to all actions performed from the selection list.

User Profile Selection List panel

When you enter L (for list) on the User Profile panel, the User Profile Selection List panel is displayed. This panel contains a list of all user profile entries that match the input specifications entered on the User Profile panel.

```
DB2P / DB2PLOCATION -- User Profile Selection List --------------------- 6.1.0
COMMAND ===>                                                  SCROLL ===> PAGE

Valid Actions Are...
A  Assign                    B  Browse
C  Create Like               D  Drop
E  Edit                      G  Invoke Governor
-----------------------------------------------------------------------------
Action          Creator   Translation      Environment  Resource Group
------          --------  ----------------  -----------  ----------------


******************************* BOTTOM OF DATA *******************************
```

If you press Enter, all rows that are selected with an action code will be
processed. After all selected rows are processed, the panel will be redisplayed
with an informative message on each row (such as *CREATED or *NODROP).
This message will appear in the space between the **Action** and `Creator`
columns.

If you press PF3, all input fields will be ignored and you will return to the
User Profile panel.

If you press PF8 or PF7, the panel will scroll forward or backward after all
selected rows have been processed.

Browsing a user profile

You can browse a user profile from a selection list or directly from the User
Profile panel.

Browsing directly

To browse a user profile entry from the User Profile panel, you must enter the
following fields:

Action
    Enter B (for browse).

Creator

Enter the creator field for the user profile. No wildcard characters are allowed.

Translation

Enter the translation field for the user profile. No wildcard characters are allowed. If you leave this field blank or enter *, the system default will be used.

Environment

Enter the environment field for the user profile, one of TSO, CICS, CICSMVS, CICSVSE, CMS, WINDOWS, or -. No wildcard characters are allowed. This field will only be displayed for QMF Version 3 and later sites.

Browsing from a selection list

To browse a user profile entry from the User Profile Selection List panel, you must enter the following field:

Action

Enter B (for browse).

Browse User Profile panel

The Browse User Profile panel is a browse-only panel; you cannot change displayed attribute values from this panel.

```
DB2P / DB2PLOCATION -- Browse User Profile ----------------------------- 6.1.0
COMMAND ===>

Creator... :            Translation... :             Environment... :
-------------------------------------------------------------------------------
Case...... : (   ) UPPER    Decimal.... : (   ) PERIOD
(   ) STRING                (   ) COMMA
(   ) MIXED                 (   ) FRENCH

Confirm... : (   ) YES    Language... : (   ) SQL
(   ) NO                   (   ) QBE
(   ) PROMPTED

Model..... : (   ) REL    Trace...... : (   ) ALL
(   ) ER                  (   ) NONE
                          (   ) Custom:

Number of Lines/Page.... :
Number of Chars/Line.... :
GDDM Printer Nickname... :
Tablespace Name......... :
Resource Group.......... :
PF Key Table............ :
Synonym Table........... :
```

If you press Enter or PF3, you will return to the previous panel.

Creating a user profile

You can create a user profile from a selection list or directly from the User Profile panel.

Creating directly

To create a user profile entry from the User Profile panel, you must enter the following fields:

Action
　Enter C (for create).

Creator
　Enter the creator field for the user profile. No wildcard characters are allowed.

Translation
　Enter the translation field for the user profile. No wildcard characters are allowed. If you leave this field blank or enter *, the system default will be used.

Environment
　Enter the environment field for the user profile, one of TSO, CICS, CICSMVS, CICSVSE, CMS, WINDOWS, or -. No wildcard characters are allowed. This field will only be displayed for QMF Version 3 and later sites.

Creating from a selection list

To create a user profile entry from the User Profile Selection List panel, you must enter the following field:

Action
　Enter C (for create). This action will be treated as a Create Like... The attributes of the profile entry selected with the action of C will be used as default attribute values on the Create User Profile panel.

Create User Profile panel

If you are creating a user profile from the User Profile panel, this panel will contain default attribute values when it is first displayed. If you are creating a user profile from the User Profile Selection List panel, this panel will contain the attribute values from the user profile that was selected.

```
DB2P ∕ DB2PLOCATION -- Create User Profile ---------------------------- 6.1.0
COMMAND ===>

Creator ===>           Translation ===>            Environment ===>
------------------------------------------------------------------------------
Case... ===> (  ) UPPER   Decimal. ===> (  ) PERIOD
(  ) STRING               (  ) COMMA
(  ) MIXED                (  ) FRENCH

Confirm ===> (  ) YES    Language ===> (  ) SQL
(  ) NO                   (  ) QBE
(  ) PROMPTED

Model.. ===> (  ) REL    Trace... ===> (  ) ALL
(  ) ER                   (  ) NONE
                         (  ) Custom:

Number of Lines∕Page. ===>
Number of Chars∕Line. ===>
GDDM Printer Nickname ===>
Tablespace Name...... ===>
Resource Group....... ===>
PF Key Table......... ===>
Synonym Table........ ===>
```

If you press Enter, the attribute values will be validated. If any errors are
detected during input validation, the panel will be redisplayed with an error
message. Otherwise, the user profile will be created (an entry will be inserted
into Q.PROFILES) and you will return to the previous panel.

If you press PF3, the attribute values will be ignored and the user profile will
not be created. You will return to the previous panel.

The fields on the panel are :

Case   This field can be any of the listed values: UPPER, STRING, MIXED.
        Enter an X by the desired selection; only one of these options can be
        selected.

Decimal
        This field can be any of the listed values: PERIOD, COMMA,
        FRENCH. Enter an X by the desired selection; only one of these
        options can be selected.

Confirm
        This field can be any of the listed values: YES, NO. Enter an X by the
        desired selection; only one of these options can be selected.

Language
        This field can be any of the listed values: SQL, QBE, PROMPTED.
        Enter an X by the desired selection; only one of these options can be
        selected.

Model This field can be any of the listed values: REL, ER. Enter an `X` by the desired selection; only one of these options can be selected.

Trace This field can be any of the listed values: ALL, NONE, or a custom value. Enter an `X` by the desired selection; only one of these options can be selected. If a custom trace value is desired, enter the trace value next to the prompt.

Length
This field must be a positive number less than 1000. Enter the maximum number of lines per report page.

Width This field must be a number between 22 and 999 inclusive. Enter the maximum number of characters per report line.

Space This field defines the tablespace used in SAVE DATA and IMPORT DATA commands. Enter the desired tablespace name here.

Printer
Enter the desired GDDM printer nickname.

Resource Group
Enter the name of the resource group to assign to this profile. If you leave this field blank, then QMF will use the user's TSO logon ID or primary authorization ID (depending on the value of the QMF startup parameter DSQSPRID).

PF-Key Table
Enter the name of the PF-key table to be used by this profile.

Synonym Table
Enter the name of the synonym table to be used by this profile.

Editing a user profile

You can edit a user profile from a selection list or directly from the User Profile panel.

Editing directly

To edit a user profile entry from the User Profile panel, you must enter the following fields:

Action
Enter `E` (for edit).

Creator
Enter the creator field for the user profile. No wildcard characters are allowed.

Translation

Enter the translation field for the user profile. No wildcard characters are allowed. If you leave this field blank or enter *, the system default will be used.

Environment

Enter the environment field for the user profile, one of TSO, CICS, CICSMVS, CICSVSE, CMS, WINDOWS, or -. No wildcard characters are allowed. This field will only be displayed for QMF Version 3 and later sites.

Editing from a selection list

To edit a user profile entry from the User Profile Selection List panel, you must enter the following field:

Action

Enter E (for edit).

Edit User Profile panel

You can change attribute values from the Edit User Profile panel. However, you cannot change the key values (creator, translation, and environment) from this panel.

```
DB2P ⁄ DB2PLOCATION -- Edit User Profile ------------------------------ 6.1.0
COMMAND ===>

Creator... :            Translation... :              Environment... :
------------------------------------------------------------------------------
Case... ===> (   ) UPPER      Decimal. ===> (   ) PERIOD
(   ) STRING                  (   ) COMMA
(   ) MIXED                   (   ) FRENCH

Confirm ===> (   ) YES        Language ===> (   ) SQL
(   ) NO                      (   ) QBE
(   ) PROMPTED

Model.. ===> (   ) REL        Trace... ===> (   ) ALL
(   ) ER                      (   ) NONE
                             (   ) Custom:
Number of Lines⁄Page. ===> 1
Number of Chars⁄Line. ===> 22
GDDM Printer Nickname ===>
Tablespace Name...... ===>
Resource Group....... ===>
PF Key Table......... ===>
Synonym Table........ ===>
```

If you press Enter, the attribute values will be validated. If any errors are detected during input validation, the panel will be redisplayed with an error message. Otherwise, the user profile will be updated and you will return to the previous panel.

If you press PF3, the attribute values will be ignored and the user profile will not be updated. You will return to the previous panel.

See "Creating a user profile" on page 196 for a description of this panel's fields.

Dropping a user profile

You can drop a user profile from a selection list or directly from the User Profile panel. In addition, Object Manager can be automatically invoked after a User Profile is dropped. This facilitates the cleaning up of objects for users who are being removed from the system.

Dropping directly

To drop a user profile entry from the User Profile panel, you must enter the following fields:

Action
> Enter D (for drop).

Creator
> Enter the creator field for the user profile. No wildcard characters are allowed.

Translation
> Enter the translation field for the user profile. No wildcard characters are allowed. If you leave this field blank or enter *, the system default will be used.

Environment
> Enter the environment field for the user profile, one of TSO, CICS, CICSMVS, CICSVSE, CMS, WINDOWS, or -. No wildcard characters are allowed. This field will only be displayed for QMF Version 3 and later sites.

Clean Up Objects?
> Enter Y to automatically invoke Object Manager after a user profile is dropped. This allows you to clean up (drop, transfer, copy, or migrate) objects for the user that was just dropped. Enter N to disable this action.

Drop Confirmation?
   Enter Y to request a drop confirmation panel or N to suppress one.

Dropping from a selection list

To drop a user profile entry from the User Profile Selection List panel, you must enter the following field:

Action
   Enter D (for drop).

User Profile Drop Confirmation panel

The user profile to be dropped is displayed on the User Profile Drop Confirmation panel, along with the number of database rows that will be deleted as a result of this drop command.

```
DB2P ∕ DB2PLOCATION -- User Profile Drop Confirmation ------------------- 6.1.0
COMMAND ===>

Press ENTER to confirm this DROP request.
Type CAN or CANCEL or press PF3 to cancel this DROP request.

User....... :
Translation :
Environment :

Number of rows to be deleted from Q.PROFILES :
```

If you press Enter, the user profile identified on the panel will be dropped from the database and you will return to the previous panel.

If you press PF3, the drop command will be ignored (the user profile will remain in the database) and you will return to the previous panel.

Assigning a resource group to a user profile

You perform assignments of resource groups to user profiles from a selection list. Once you choose the assignment action from the User Profile panel or from the User Profile Selection List panel, you must set up a resource group selection list.

Assigning directly

To assign a resource group to a user profile entry from the User Profile panel, you must enter the following fields:

Action
    Enter A (for assign).

Creator
    Enter the creator field for the user profile. No wildcard characters are allowed.

Translation
    Enter the translation field for the user profile. No wildcard characters are allowed. If you leave this field blank or enter *, the system default will be used.

Environment
    Enter the environment field for the user profile, one of TSO, CICS, CICSMVS, CICSVSE, CMS, WINDOWS, or -. No wildcard characters are allowed. This field will only be displayed for QMF Version 3 and later sites.

Assigning from a selection list

To assign a resource group to a user profile entry from the User Profile Selection List panel, you must enter the following field:

Action
    Enter A (for assign).

User Profile Assignment panel 1 of 2

This is the first of two assignment panels that will be displayed.

```
DB2P ⁄ DB2PLOCATION -- User Profile Assignment ------------------------ 6.1.0
COMMAND ===>

Creator................ :
Translation............ :
Environment............ :

Is currently assigned to :


Resource Group....... ===>

------------------------------------------------------------------------------
Use this panel to build a selection-list of Resource Groups.
```

If you press Enter, a selection list of all qualifying resource groups will be built.

If you press PF3, the assignment will be bypassed and you will return to the previous panel.

Building the assignment selection list

Enter the following information on the User Profile Assignment panel 1:

Resource Group

Enter the resource group to include in the list. You can use % and _ as wildcard characters in the resource group name to select multiple resource groups.

User Profile Assignment panel 2 of 2

This is the panel from which you process the assignments.

```
DB2P ∕ DB2PLOCATION -- User Profile Assignment ------------------------ 6.1.0
COMMAND ===>                                               SCROLL ===> PAGE

Valid Actions are...
A --Assign Resource Group to User Profile
U --Unassign Resource Group from User Profile

Creator.... :
Translation :
Environment :

Action          Resource Group   Description
------          ---------------   --------------------------------------

***************************** BOTTOM OF DATA ******************************
```

If you press Enter, the selected assignment will be processed, the database will
be updated, and you will return to the previous panel (because a user profile
can be assigned to one and only one resource group).

- If you press PF3, any pending assignment will be bypassed and you will
  return to the previous panel.

Chapter 10. Error Log Facility

When QMF detects a system or resource error, it writes an entry to the Q.ERROR_LOG table. Errors are logged by user and message number and are date and time stamped. System programmers and troubleshooters refer to error log entries to resolve outstanding QMF problems. You can review and manipulate the error log using the Error Log Facility. The following actions are supported:

- Browsing a log entry
- Deleting a log entry
- Archiving a log entry

Error log entries are stored in your site's QMF error log table. The name of this table is Q.ERROR_LOG. For a detailed discussion of this table, see *Managing QMF for MVS.*

QMF continually inserts entries into the QMF error log table. It is your responsibility to review this table for outstanding problems and remove resolved error log entries. If entries are not removed, this table continues to grow, tying up excessive DASD storage.

A well maintained error log table will ensure that you are not wasting critical system resources and that outstanding errors are resolved.

Displaying the Error Log panel

You perform all error log maintenance from the Error Log panel, which you can access by selecting option 6 from the Manager Selection Menu. You can also invoke this panel by issuing the following TSO command:

```
CALL 'QMFHPO.SRAALOAD(RAAMAIN)' 'RM E'
```

```
DB2P / DB2PLOCATION -- Error Log -------------------------------------- 6.1.0
COMMAND ===>

Action................... ===>

From Date................ ===>                  To Date...... ===>
From Time (HH:MM)......... ===>                  To Time...... ===>
User..................... ===>
Message Number........... ===>

Asc/Desc Option (A/D)..... ===>
Delete Confirmation? (Y/N) ===>

Error Log Archive DSN..... ===>


--------------------------------------------------------------------------------
Valid Actions Are...
A  Archive
B  Browse
D  Delete
L  Display Selection List
--------------------------------------------------------------------------------
```

If you press Enter, all input fields will be processed. If any errors are detected during input validation, the panel will be redisplayed with an error message.

If you press PF3, all input fields will be ignored and you will return to the previous panel.

Building a selection list of error log entries

To build a selection list of error log entries from the Error Log panel, you must enter the following fields:

Action

Enter L (for list).

From Date

Enter a date (the format of this date depends on the version/release and maintenance level of QMF). Errors logged on or after this date will be selected.

To Date

Enter a date (the format of this date depends on the version/release and maintenance level of QMF). Errors logged on or before this date will be selected. If you leave this field blank, **From Date** will be used as the default.

From Time

Enter a time of the form HH:MM. Errors logged on **From Date** at or after this time will be selected. If you leave this field blank, `00:00` will be used as the default.

To Time

Enter a time of the form HH:MM. Errors logged on **To Date** at or before this time will be selected. If you leave this field blank, `24:00` will be used as the default.

User Enter the user for whom the error was logged. You can use % and _ as wildcard characters in the user to select entries from multiple users. If you leave this field blank, % will be used as the default.

Message Number

Enter the message number for the logged error. You can use % and _ as wildcard characters in the message number to select entries with multiple error message numbers. If you leave this field blank, % will be used as the default.

Asc/Desc Option

This flag determines the order of entries in the selection list. Enter `A` to list the entries in ascending (chronological) order. Enter `D` to list the entries in descending (reverse chronological) order.

Delete Confirmation?

Enter `Y` to request delete confirmations or `N` to suppress them. This value will be carried forward to all actions performed from the selection list.

Archive Data Set

Enter the name of a data set to which error log entries will be archived. This data set must be catalogued and must have DSORG=PS and LRECL=131.

Error Log Selection List panel

When you enter `L` (for list) on the Error Log panel, the Error Log Selection List panel will be displayed. This panel will contain a list of all error log entries that matched the input criteria entered on the Error Log panel.

```
CALL 'QMFHPO.SRAALOAD(RAAMAIN)' 'RM E'
DB2P ⁄ DB2PLOCATION -- Error Log -------------------------------------- 6.1.0
COMMAND ===>


Action................... ===>

From Date................ ===>                    To Date...... ===>
From Time (HH:MM)......... ===>                    To Time...... ===>
User..................... ===>
Message Number........... ===>

Asc⁄Desc Option (A⁄D)..... ===>
Delete Confirmation? (Y⁄N) ===>

Error Log Archive DSN..... ===>



--------------------------------------------------------------------------------
Valid Actions Are...
A  Archive
B  Browse
D  Delete
L  Display Selection List
---------------------------------------------------------
```

If you press Enter, all rows that are selected with an action code will be
processed. After all selected rows are processed, the panel will be redisplayed
with an informative message on each row (such as *BROWSED or
*NOARCH). This message will appear in the space between the **Action** and
Date columns.

If you press PF3, all input fields will be ignored and you will return to the
Error Log panel.

If you press PF8 or PF7, the panel will scroll forward or backward after all
selected rows have been processed.

Browsing an error log entry

You can browse an error log entry from a selection list or directly from the
Error Log panel.

Browsing directly

To browse an error log entry from the Error Log panel, you must enter the
following fields:

Action
> Enter B (for browse).

From Date

Identify the date the entry was logged.

To Date

This field is ignored when **Action** is B.

From Time

Identify the time the entry was logged

To Time

This field is ignored when **Action** is B.

User   Enter the user for whom the entry was logged.

Message Number

Enter the QMF message number of the entry.

Browsing from a selection list

To browse an error log entry from the Error Log Selection List panel, you must enter the following field:

Action

Enter B (for browse).

Browse Error Log Entry panel

The message text associated with the selected error log entry is displayed on the Browse Error Log Entry panel.

```
 DB2P ⁄ DB2PLOCATION -- Browse Error Log -------------------------------- 6.1.0
COMMAND ===>                                                 SCROLL ===> PAGE

User:                    Date:
Msg :                    Time:

Message Text
-------------------------------------------------

- - - - - - - - - - - - - - - - - - - - - - - - -
****************************** BOTTOM OF DATA ********************************
```

If you press PF3, the browse session will end and you will return to the previous panel.

If you press PF8 or PF7, the message text will scroll forward or backward.

Deleting an error log entry

You can delete an error log entry or multiple entries from a selection list or directly from the Error Log panel.

Deleting directly

To delete an error log entry from the Error Log panel, you must enter the following fields:

Action
Enter D (for delete).

From Date
Enter a date (the format of this date depends on the version/release and maintenance level of QMF). Errors logged on or after this date will be deleted.

To Date
Enter a date (the format of this date depends on the version/release and maintenance level of QMF). Errors logged on or before this date will be deleted. If you leave this field blank, **From Date** will be used as the default.

From Time
Enter a time of the form HH:MM. Errors logged on **From Date** at or after this time will be deleted. If you leave this field blank, 00:00 will be used as the default.

To Time
Enter a time of the form HH:MM. Errors logged on **To Date** at or before this time will be deleted. If you leave this field blank, 24:00 will be used as the default.

User Enter the user for whom the error was logged. You can use % and _ as wildcard characters in the user to delete entries from multiple users. If you leave this field blank, % will be used as the default.

Message Number
Enter the message number for the logged error. You can use % and _ as wildcard characters in the message number to delete entries with multiple error message numbers. If you leave this field blank, % will be used as the default.

Delete Confirmation?
Enter Y to request a delete confirmation panel or N to suppress one.

Deleting from a selection list

To delete an error log entry from the Error Log Selection List panel, you must enter the following field:

Action
Enter D (for delete).

Error Log Delete Confirmation panel

The number of database rows that will be deleted as a result of this delete command is displayed on Error Log Delete Confirmation panel.

```
 DB2P ⁄ DB2PLOCATION -- Error Log Delete Confirmation ------------------- 6.1.0
COMMAND ===>

Press ENTER to confirm this DELETE request.
Type CAN or CANCEL or press PF3 to cancel this DELETE request.


Number of error log entries to be deleted :
```

If you press Enter, the error log entry identified on the panel will be deleted from the database and you will return to the previous panel.

If you press PF3, the delete command will be ignored (the error log entry will remain in the database) and you will return to the previous panel.

Archiving an error log entry

You can archive an error log entry or multiple entries from a selection list or directly from the Error Log panel. The archive process will write the entire error log entry to the archive data set identified on the Error Log panel and then remove the error log entry from the QMF system table.

Archiving directly

To archive an error log entry from the Error Log panel, you must enter the following fields:

Action
Enter A (for archive).

From Date
Enter a date (the format of this date depends on the version⁄release and maintenance level of QMF). Errors logged on or after this date will be archived.

To Date

Enter a date (the format of this date depends on the version/release and maintenance level of QMF). Errors logged on or before this date will be archived. If you leave this field blank, **From Date** will be used as the default.

From Time

Enter a time of the form HH:MM. Errors logged on **From Date** at or after this time will be archived. If you leave this field blank, `00:00` will be used as the default.

To Time

Enter a time of the form HH:MM. Errors logged on **To Date** at or before this time will be archived. If you leave this field blank, `24:00` will be used as the default.

User Enter the user for whom the error was logged. You can use % and _ as wildcard characters in the user to archive entries from multiple users. If you leave this field blank, % will be used as the default.

Message Number

Enter the message number for the logged error. You can use % and _ as wildcard characters in the message number to archive entries with multiple error message numbers. If you leave this field blank, % will be used as the default.

Delete Confirmation?

Enter `Y` to request a delete confirmation panel or `N` to suppress one.

Archiving from a selection list

To archive an error log entry from the Error Log Selection List panel, you must enter the following field:

Action

Enter `A` (for archive).

Error Log Archive Confirmation panel

The number of database rows that will be printed (and deleted) as a result of this archive command is displayed on the Error Log Archive Confirmation panel.

```
DB2P ∕ DB2PLOCATION -- Error Log Archive Confirmation ------------------- 6.1.0
COMMAND ===>

Press ENTER to confirm this ARCHIVE request.
Type CAN or CANCEL or press PF3 to cancel this ARCHIVE request.


Number of error log entries to be archived :
Rows will be written to this archive data set before they are deleted :
```

If you press Enter, the error log entry identified on the panel will be written
to your archive data set and then deleted from the database. You will return
to the previous panel.

- If you press PF3, the archive command will be ignored and the error log
  entry will not be written to your archive data set and will remain in the
  database. You will return to the previous panel.

Chapter 11. Spill File Facility

QMF uses a spill file when there is no more room in virtual storage for the current data object. You can think of the spill file as a temporary storage area utilized by QMF when virtual storage is not large enough to hold the current data object.

The spill file allocation for each user should be large enough to hold all rows from the largest accessed table. If you do not allocate a spill file for a user or if you allocate a spill file that is too small, problems may result. QMF will most likely encounter an insufficient storage condition which will in turn cause response time degradation.

The Spill File online facility will help to ensure the correct allocation for a user's spill file. By entering the name of a table and the type of device on which the spill file will reside, the allocation will be calculated automatically.

Displaying the Spill File panel

When you select option 7 from the Manager Selection Menu, the Spill File panel is displayed. You can also invoke this panel by issuing the following TSO command:

```
CALL 'QMFHPO.SRAALOAD(RAAMAIN)' 'RM S'
```

```
DB2P ╱ DB2PLOCATION -- Spill File -------------------------------------- 6.1.0
COMMAND ===>

To calculate the number of tracks to allocate for spill file, enter:

Name of Largest Table (Creator) ===>
                      (Name)... ===>

Device Type (3350, 3380, 3390) ===>


--------------------------------------------------------------------------------
When you press ENTER, the spill file allocation will be computed.

Maximum number of tracks for spill file:
--------------------------------------------------------------------------------
```

If you press Enter, the appropriate spill file track allocation will be calculated
based on your input table name and the storage device type.

If you press PF3, you will return to the previous panel without performing
any more calculations.

Calculating spill file allocation

Enter the following information on the Spill File panel:

Name of Largest Table (Creator)
> Enter the creator of the largest table that will be accessed in a QMF
> session.

Name of Largest Table (Name)
> Enter the name of the largest table that will be accessed in a QMF
> session.

Device Type
> Enter the type of device on which the spill file will be stored (one of
> 3350, 3380, or 3390).

Chapter 12. HPO Activity Log JCL

The HPO Activity Log is a repository for QMF session activity and object usage information. This chapter discusses the batch job used to process the log data sets.

There are three components to the HPO Activity Log:
- The HPO Activity Log data sets
- The HPO Activity Log tables
- The HPO Activity Log batch job

As described in "Chapter 5. Object Manager" on page 103, The HPO/Governor Module writes directly to the HPO Activity Log data sets. A batch job is run periodically to copy the HPO Activity Log data sets to the HPO Activity Log tables. This facility generates the JCL for this batch job. This JCL can be generated once and then added to your job scheduling system.

The HPO Activity Log data sets

All of the HPO Activity Log data sets must be specified to (and optionally created by) the HPO Configuration Dialog. For more information about the requirements for these data sets, see "Step 12f. Set The HPO/Governor Module configuration parameters" on page 245.

The current HPO Activity Log data sets

These data sets must be processed periodically (daily, nightly, etc.) by the HPO Activity Log batch job. After successful completion of the batch job, these current data sets are automatically reset.

TSO activity log
: Current QMF activity under TSO is recorded in this data set.

TSO SQL text log
: SQL text associated with current QMF activity under TSO is recorded in this data set.

CICS activity log
: Current QMF activity under CICS is recorded in this data set.

CICS SQL text log
: SQL text associated with current QMF activity under CICS is recorded in this data set.

The historical HPO Activity Log data sets

These data sets are updated by the HPO Activity Log batch job.

Sorted activity log
> Current TSO and CICS session activity is sorted and written to this data set.

Archive activity log
> The sorted activity log is appended to this data set for historical purposes.

Archive SQL text log
> The current TSO and CICS SQL text data sets are appended to this data set for historical purposes.

The HPO Activity Log tables

All of the HPO Activity Log tables must be created during the installation process. For a complete discussion of these tables, indexes, tablespaces, and the HPO database, see "Step 1a. Create database, tablespaces, tables, and indexes" on page 230 and "Appendix F. HPO DB2 tables" on page 323.

The HPO Activity Log batch job

The log data sets must be processed periodically by the HPO Activity Log batch job. Because this facility needs exclusive access to the log data sets, you should schedule this job for a time when there is no QMF activity. You can use the HPO Activity Log JCL panel to generate JCL to run a batch job that performs these functions:

- Sorts the current TSO and CICS activity log files into the sorted activity log file
- Updates Q.OBJ_ACTIVITY_SUMM and Q.OBJ_ACTIVITY_DTL from the sorted activity log file and the current TSO and CICS SQL text log files
- Appends the sorted activity log file to the historical archive activity log file
- Appends the SQL text log files to the historical archive SQL text log file
- Resets the TSO activity log file
- Resets the CICS activity log file
- Resets the sorted activity log file
- Resets the TSO SQL text log file
- Resets the CICS SQL text log file

HPO Activity Log JCL panel

You can access the HPO Activity Log JCL panel by selecting option 8 from the Manager Selection Menu, or by issuing the following TSO command:

```
CALL 'QMFHPO.SRAALOAD(RAAMAIN)' 'RM L'
```

```
DB2P / DB2PLOCATION -- HPO Activity Log JCL ---------------------------- 6.1.0
COMMAND ===>

Press ENTER to build JCL.
Type CAN or CANCEL or press PF3 to cancel this request.

1. Process TSO Activity Logs? (Y/N)............................. ===> Y
2. Process CICS Activity Logs? (Y/N)............................ ===> Y

3. Delete historical data when an object is erased? (Y/N)........ ===> Y
4. Delete historical data when an object is re-saved? (Y/N)...... ===> N
5. Process data at remote locations? (Y/N)...................... ===> Y

6. Job Cards...
     ===>
     ===>
     ===>
     ===>

7. Edit or Submit JCL?... ===>      (E=Edit, S=Submit)
```

If you press Enter, JCL will be generated. This JCL contains the steps necessary to completely process the log data sets. If the **Edit or Submit JCL?** flag is set to E, an ISPF edit session will be invoked, allowing you to view and optionally modify the generated JCL. You must explicitly issue the TSO SUBMIT command if you wish to submit the JCL. If the `Edit or Submit JCL?` flag is set to S, the JCL will automatically be submitted without editing it.

If you press PF3, you will return to the previous panel, bypassing JCL generation.

The fields on the panel are:

Process TSO Activity Logs? (Y/N)
> Enter a Y here to process the TSO activity logs as defined in your configuration file.

Process CICS Activity Logs? (Y/N)
> Enter a Y here to process the CICS activity logs as defined in your configuration file.

Delete historical data when an object is erased? (Y/N)?
> This flag is used as input to the batch job. If you enter Y, ERASE commands that have been logged will cause corresponding rows in

the activity tables to be deleted. If you enter N, then no deletes are performed against the tables and you must remove rows for obsolete objects from the tables manually. The default value is Y.

Delete historical data when an object is re-saved? (Y/N)?
This flag is used as input to the batch job. If you enter Y, SAVE and IMPORT commands that have been logged will cause corresponding rows in the activity tables to be deleted, and the object will be re-saved as if new. If you enter N, then no deletes are performed against the tables and the new object activity is considered an extension of the old. The default value is N.

Process data at remote locations (Y/N)?
This flag is used as input to the batch job. If you enter Y, remote locations will be processed. If you enter N, then remote locations will not processed. The default value is Y. If specific locations need to be included or excluded from processing, set this flag to Y and use the optional INCLUDE or EXCLUDE DD statements (see "Location Processing of HPO Activity Log Records" on page 223 for more information on remote location processing.)

Job Cards
Enter valid job cards for the job. At least one line must be entered. Any lines specified will be used exactly as entered in the generated JCL.

Edit or Submit JCL?
Enter E to edit the generated JCL or S to automatically submit it after it is generated.

Understanding the generated JCL

The generated JCL is described in this section. This description assumes that all TSO and CICS log data sets are configured. If any are omitted, the corresponding steps and DDs are automatically omitted from the generated JCL.

Step SORT1

This step sorts the TSO and CICS activity log files and merges them into the sorted activity log file.

Step Name	SORT1
Program	SORT
Input Data Sets (DD=SORTIN)	Current TSO and CICS activity log files
Input Data Set Disposition	OLD

Output Data Set (DD=SORTOUT)	Sorted activity log file
Output Data Set Disposition	OLD
If job terminates in this step:	Restart at job start

Step LOAD2

This step updates the HPO Activity Log table, loading the information from the sorted activity log file and the SQL text log files into DB2.

Step Name	LOAD2
Program	RAAOMLD
Input Data Set (DD=RAALOG)	Sorted activity log file (SORTOUT from previous step)
Input Data Set (DD=RAALOG2)	Current TSO and CICS SQL text log files
Input Data Set (DD=INCLUDE) Note: this DD is not generated automatically	Optional DD; read only if remote location parm = Y. Sysin listing for all desired included locations.
Input Data Set (DD=EXCLUDE) Note: this DD is not generated automatically	Optional DD; read only if remote location parm = Y. Sysin listing for all desired excluded locations.
DB2 Tables Updated	Q.OBJ_ACTIVITY_SUMM and Q.OBJ_ACTIVITY_DTL
If job terminates in this step:	Restart at LOAD2 step only.

Step ARCH3

This step appends the sorted activity log file to the activity archive log file.

Step Name	ARCH3
Program	IEBGENER
Input Data Set (DD=SYSUT1)	Sorted activity log file
Input Data Set Disposition	OLD
Output Data Set (DD=SYSUT2)	Archive activity log file
Output Data Set Disposition	MOD (data will be appended to the archive log file)
If job terminates in this step:	First, restore the archive activity log file (SYSUT2 data set) to its state prior to executing this step. After the archive activity log file is restored, restart at ARCH3 step only.

Step ARCH4

This step appends the SQL text log files to the SQL text archive log file.

Step Name	ARCH4
Program	IEBGENER

Input Data Set (DD=SYSUT1)	Current TSO and CICS SQL text log files
Input Data Set Disposition	OLD
Output Data Set (DD=SYSUT2)	Archive SQL text log file
Output Data Set Disposition	MOD (data will be appended to the archive log file)
If job terminates in this step:	First, restore the archive SQL text log file (SYSUT2 data set) to its state prior to executing this step. After the archive log file is restored, restart at ARCH4 step only.

Step INIT5

This step reinitializes the TSO activity log file.

Step Name	INIT5
Program	RAAMT
Input Data Set (DD=SYSUT1)	Current TSO activity log file
Input Data Set Disposition	OLD
If job terminates in this step:	Restart at INIT5 step only.

Step INIT6

This step reinitializes the CICS activity log file.

Step Name	INIT6
Program	RAAMT
Input Data Set (DD=SYSUT1)	Current CICS activity log file
Input Data Set Disposition	OLD
If job terminates in this step:	Restart at INIT6 step only.

Step INIT7

This step reinitializes the sorted activity log file.

Step Name	INIT7
Program	RAAMT
Input Data Set (DD=SYSUT1)	Sorted activity log file
Input Data Set Disposition	OLD
If job terminates in this step:	Restart at INIT7 step only.

Step INIT8

This step reinitializes the TSO SQL text log file.

Step Name	INIT8
Program	RAAMT
Input Data Set (DD=SYSUT1)	TSO SQL text log file
Input Data Set Disposition	OLD
If job terminates in this step:	Restart at INIT8 step only.

Step INIT9

This step reinitializes the CICS SQL text log file.

Step Name	INIT8
Program	RAAMT
Input Data Set (DD=SYSUT1)	CICS SQL text log file
Input Data Set Disposition	OLD
If job terminates in this step:	Restart at INIT9 step only.

Location Processing of HPO Activity Log Records

QMF activity at remote locations is recorded in the HPO Activity Log datasets. For example, suppose a QMF CONNECT command is followed by a RUN QUERY command. This RUN QUERY command will be tracked with an indicator that it was executed at the remote DB2 location (the target of the CONNECT statement). When processing the log records through the batch job, the **Process data at remote locations?** parameter determines whether or not the records should be processed at that remote location. An internal connection to the remote location is attempted and the DB2 activity log tables at that remote location will be updated as appropriate. The local DB2 activity log tables are not affected, regardless of the setting of the parameter, for this particular record.

Additional granularity is provided with two optional input DD cards. Either an INCLUDE DD * or EXCLUDE DD * card (but not both) can be specified on the job step LOAD2 explicitly naming the locations to include or omit from processing. The **Process data at remote locations?** parameter must be set to Y, or else the location DD's will be ignored. When it is set to Y, and neither DD above is present, all remote locations will be processed.

Note: If the parameter is set to Y, and the INCLUDE DD * card is present, the local location must be defined in the list of locations in order to process the local DB2 records.

The following sample JCL will process all records for DB2A, as well as all remote activity at DB2B and DB2C (assume LOCATION_ DB2A is location name for subsystem DB2A, etc.) Any other location records found in the file will be bypassed.

```
//...
//LOAD2    EXEC PGM=RAAOMLD,PARM='DB2A,YYY'
//STEPLIB    DD DSN=QMFHPO.LOADLIB,DISP=SHR
//           DD DSN=DB2.LOADLIB,DISP=SHR
//LOADMSGS   DD SYSOUT=*
//RAALOG     DD DSN=SORTED.LOG,DISP=SHR
//RAALOG2    DD DSN=SQL.LOG,DISP=SHR
//INCLUDE    DD *
LOCATION_DB2A
LOCATION_DB2B
LOCATION_DB2C
/*
//...
```

The following JCL will process all records for DB2A, as well as all remote activity at any location except DB2B, which will be bypassed.

```
//...
//LOAD2    EXEC PGM=RAAOMLD,PARM='DB2A,YYY'
//STEPLIB    DD DSN=QMFHPO.LOADLIB,DISP=SHR
//           DD  DSN=DB2.LOADLIB,DISP=SHR
//LOADMSGS   DD SYSOUT=*
//RAALOG     DD DSN=SORTED.LOG,DISP=SHR
//RAALOG2    DD DSN=SQL.LOG,DISP=SHR
//EXCLUDE    DD *
LOCATION_DB2B
/*
//...
```

Note: Had the **Process data at remote locations?** parameter for either example above specified N for location processing (e.g., PARM='DB2A,YYN') the INCLUDE and EXCLUDE DD cards would have been ignored and only DB2A location records would be processed.

Cleanup of HPO Activity Log tables

As historical data is added to the HPO Activity Log tables, you must perform maintenance on the tables, tablespaces, and indexes. (The Q.OBJ_ACTIVITY_DTL table grows substantially faster than the Q.OBJ_ACTIVITY_SUMM table, and therefore requires more careful maintenance.) The following recommendations will assist you in maintaining efficient performance:

• Make sure RUNSTATS is run for the appropriate tablespaces and indexes.

Chapter 13. QMF Start-Up Parameters

You can control the characteristics of a QMF session that you start by passing
any of numerous parameters to it. For example, there are parameters to
identify the DB2 environment, the QMF plan, and other performance-related
parameters. Tuning these parameters typically requires manual changes to
CLISTs and EXECs. You can easily tune and customize these parameters by
using the QMF Start-Up Parameters panel. You can specify values for all of
the possible QMF start-up parameters, and you can start a QMF session using
those parameters.

Displaying the QMF Start-Up Parameters panel

When you select option 9 from the Manager Selection Menu, the QMF
Start-Up Parameters panel is displayed. You can also invoke this panel by
issuing the following TSO command:

CALL 'QMFHPO.SRAALOAD(RAAMAIN)' 'RM Q'

```
DB2P ⁄ DB2PLOCATION -- QMF Start-Up Parameters ------------------------- 6.1.0
COMMAND ===>

Long     Short
Form     Form
-------- -----
DSQSBSTG  B   ==>                 Maximum storage for reports (Version 3 parm)
DSQSDBCS  K   ==>                 DBCS support at a non-DBCS terminal
DSQSDBNM  D   ==>
                                  Location for initial connection (Version 3 parm)
DSQSDBUG  T   ==>                 Trace options
DSQSIROW  F   ==>                 Maximum number of fetched rows
DSQSMODE  M   ==>                 Mode of operation
DSQSPILL  L   ==>                 Use the spill file (Version 3 parm)
DSQSPLAN  P   ==>                 Name of QMF application plan
DSQSPRID  U   ==>                 Profile key (Version 3 parm)
DSQSRSTG  R   ==>                 Amount of reserved storage
DSQSRUN   I   ==>
                                   Name of called procedure


------------------------------------------------------------------------------
Start a QMF session using these parameters? (Y⁄N) ===>
```

If you press Enter, the current parameters will be saved in your ISPF profile.
If you set the **Start a QMF session using these parameters?** flag to Y, then a
QMF session will be started using these parameters.

If you press PF3, you will return to the previous panel without saving the current parameters.

To use the default value for a parameter, leave the field for that parameter blank.

The fields on the panel are :

DSQSBSTG (B-Parm)
> Enter the amount of storage to reserve for the data object (in bytes). This parameter is ignored for QMF Version 2.

DSQSDBCS (K-Parm)
> Enter a Y if you are printing DBCS data from or on a non-DBCS device.

DSQSDBNM (D-Parm)
> Enter the location that should be used for the initial connection. This parm is only used for QMF Version 3 Release 1.1 and above.

DSQSDBUG (T-Parm)
> Enter any desired trace options.

DSQSIROW (F-Parm)
> Enter the maximum number of rows to be fetched before the first screen of report data is displayed.

DSQSPILL (L-Parm)
> Specify whether the spill file can be used for this QMF session. This parameter is ignored for QMF Version 2.

DSQSMODE (M-Parm)
> Specify batch mode or interactive mode.

DSQSPLAN (P-Parm)
> Enter the name of the QMF application plan.

DSQSPRID (U-Parm)
> Enter the profile key setting to be used when validating the QMF profile. The two valid values are TSOID or PRIMEID. This parameter is ignored for QMF Version 2.

DSQSRSTG (R-Parm)
> Enter the amount of storage to reserve for this QMF session (in bytes).

DSQSRUN (I-Parm)
> Enter the procedure that should be invoked when the QMF session is started.

Start a QMF session using these parameters?

Note: If this flag is set to Y when you press Enter, then a QMF session will be started using these options. If this flag is set to N, then a session will not be started, however you will remain on the panel until you press PF3.

Chapter 14. Installation

These instructions cover the installation of QMF HPO components. If you are installing both HPO/Compiler and HPO/Manager, follow all installation steps. If you are installing only one of HPO/Compiler or HPO/Manager, you can skip those steps that do not pertain to the feature you are installing.

Planning for installation

Three sets of requirements should be verified before beginning installation:

- Program product requirements
- DASD requirements
- DB2 privileges

Program product requirements

The program product requirements are the same as those of QMF.

Program Product	Minimum Versionand Release Level
QMF	Version 3 Release 1.1
DB2	Version 2 Release 3
MVS	Version 2 Release 2
TSO/E	Version 1 Release 4
ISPF	Version 2 Release 3
CICS	Version 2 Release 1

Required DB2 privileges

You must be authorized with the following DB2 privileges to perform the installation:

Object Type	Object	Privileges
System	System	CREATEDBA or CREATEDBC, BINDADD
Collection	RAACOLL	CREATE IN
Database	RAADB	CREATETS, CREATETAB
Tables	Q.ERROR_LOG	DELETE, INSERT, SELECT, UPDATE
	Q.OBJECT_DATA	DELETE, INSERT, SELECT, UPDATE

	Q.OBJECT_REMARKS	DELETE, INSERT, SELECT, UPDATE
	Q.OBJECT_DIRECTORY	DELETE, INSERT, SELECT, UPDATE
	Q.PROFILES	DELETE, INSERT, SELECT, UPDATE
	Q.RESOURCE_TABLE	DELETE, INSERT, SELECT, UPDATE
	Q.OBJ_ACTIVITY_SUMM	ALL
	Q.OBJ_ACTIVITY_DTL	ALL
	Q.REPORTS	ALL
	Q.REPORT_VARIABLES	ALL
	SYSIBM.SYSCOLUMNS	SELECT
	SYSIBM.SYSDATABASE	SELECT
	SYSIBM.SYSINDEXES	SELECT
	SYSIBM.SYSKEYS	SELECT
	SYSIBM.SYSTABLES	SELECT
	SYSIBM.SYSTABLESPACE	SELECT
	SYSIBM.SYSVIEWS	SELECT
	SYSIBM.SYSVIEWDEP	SELECT
	SYSIBM.SYSSYNONYMS	SELECT

Installing HPO

Before you install HPO, make sure that the product requirements specified in the appropriate DB2 program directory have been met. After you have verified all requirements, you can begin the installation process.

Step 1a. Create database, tablespaces, tables, and indexes

Note: Skip this step if these DB2 objects already exist.

Note: DB2 documentation and your site's DB2 administration staff are the authoritative sources for information on how to create databases, tablespaces, tables, and indexes. All supplied DDL is very generic and should be reviewed and modified to meet your site's standards for DB2 object placement and creation.

Note: You must not change any table names, including the owner.

Execute the DDL in the following member in QMFHPO.SRAASAMP:

RAADDL0
> This member creates a database RAADB, tablespaces

RAADB.RAATS1, RAADB.RAATS2, RAADB.RAATS3, and
RAADB.RAATS4, tables Q.OBJ_ACTIVITY_SUMM,
Q.OBJ_ACTIVIY_DTL, Q.REPORTS, and Q.REPORT_VARIABLES, and
indexes Q.RAAIX1, Q.RAAIX2, Q.RAAIX3, and Q.RAAIX4.

Step 1b. Alter HPO Activity Log table

Skip this step if you are **not** using Manager.

Skip this step if you executed "Step 1a. Create database, tablespaces, tables,
and indexes" on page 230.

Follow the instructions below to determine which one of the listed DDL
members in QMFHPO.SRAASAMP need to be run.

RAADDL2A
Skip this SQL if these columns already exist. This member contains
ALTER statements that add these new columns to the
Q.OBJ_ACTIVITY_SUMM table: LMDATE, LMTIME, LMTSOID,
LMSQLID, LMACTN, LMENVIRO, and LMMODE.

RAADDL3A
Skip this SQL if this column (IXTIME) already exists and if these
columns (FACTN, LACTN, and LMACTN) are defined with FOR BIT
DATA. This member contains SQL that changes multiple objects. First,
it contains an ALTER statement to add a new column (IXTIME) to the
Q.OBJ_ACTIVITY_DTL table. Secondly, the index on this table is
dropped and then created including this new column. Finally, the
FACTN, LACTN, and LMACTN columns in
Q.OBJ_ACTIVITY_SUMM are redefined with FOR BIT DATA by
updating their column definitions in SYSIBM.SYSCOLUMNS.

Step 2a. Create Compiler command synonyms

Skip this step if you are **not** using Compiler.

Skip this step if these QMF command synonyms already exist.

Execute the following member in QMFHPO.SRAASAMP:

RAADML1
This member creates two QMF command synonyms: one named RCO
to invoke Program Generator and another named LIST REPORTS to
invoke the End User Facility. Before executing this member, update
the command synonym text to reflect the name of
QMFHPO.SRAALOAD at your site.

Step 2b. Create Manager command synonyms

Skip this step if you are **not** using Manager.

Skip this step if these QMF command synonyms already exist.

Execute the following member in QMFHPO.SRAASAMP:

RAADML2
> This member creates two QMF command synonyms: one named
> RLIMITS to display the governing schedule and all associated
> processing options and restrictions currently active in a QMF session
> and another named RQA to invoke selective query analysis.

Step 3. Create Monitor VSAM file

Skip this step if you are **not** using Manager.

Skip this step if this VSAM file already exists.

A VSAM file must be created and initialized for each DB2 subsystem before
using Monitor. The member named RAAIDCMM in QMFHPO.SRAASAMP
contains sample JCL to create this file. You must modify this member
according to the instructions in it before running it.

The space allocation for this file will need to be adjusted based on the amount
of QMF activity and the frequency with which the cleanup job is run. Use the
following formulas to produce an initial estimate for the space allocation:

- If you will be tracking SQL text along with activity, allocate (5 * the number
  of QMF users * the number days between running the cleanup job) tracks
  for the DATA component.
- If you will not be tracking SQL text along with activity, allocate (1 * the
  number of QMF users * the number days between running the cleanup job)
  tracks for the DATA component.

Tailoring for TSO

This section describes tailoring for TSO.

Step 4a. Allocating libraries

The HPO libraries must be allocated to use the products. There are several
ways to perform these allocations, depending on how QMF and DB2 library
allocations are currently performed at your site.

If QMF and DB2 libraries are currently allocated in a user's TSO logon procedure, review and select from the following allocation scenarios 1 and 2. If QMF and DB2 libraries are currently allocated dynamically from within a CLIST or EXEC, review and select from the following allocation scenarios 3 and 4.

Note: The QMF and DB2 load library allocations cannot be performed with a dynamic LIBDEF for ISPLLIB , however, the allocation for QMFHPO.SRAALOAD can.

Note: Only HPO library allocations with corresponding QMF and DB2 allocations are shown in these allocation scenarios. Any additional QMF and DB2 allocations should be left unchanged.

Allocation scenario 1

If explicit library allocations for QMF and DB2 libraries currently exist in a user's TSO logon procedure, set the **Automatically LIBDEF and ALTLIB?** configuration parameter to N (see "Step 12c. Set data set names" on page 242). Also, add explicit HPO library allocations to the same logon procedure:

```
//ISPMLIB   DD    DSN=QMFHPO.SRAAISPM,DISP=SHR
//          DD    DSN=QMF610.DSQMLIBE,DISP=SHR
//          DD    DSN=DSN310.SDSNSPFM,DISP=SHR
//ISPLLIB   DD    DSN=QMFHPO.SRAALOAD,DISP=SHR
//          DD    DSN=QMF610.DSQLOAD,DISP=SHR
//          DD    DSN=DSN310.SDSNLOAD,DISP=SHR
//ISPPLIB   DD    DSN=QMFHPO.SRAAISPP,DISP=SHR
//          DD    DSN=QMF610.DSQPLIBE,DISP=SHR
//          DD    DSN=DSN310.SDSNSPFP,DISP=SHR
//SYSPROC   DD    DSN=QMFHPO.SRAACLST,DISP=SHR
//          DD    DSN=QMFHPO.SRAAEXEC,DISP=SHR
//          DD    DSN=QMF610.DSQCLSTE,DISP=SHR
//          DD    DSN=DSN310.SDSNCLIST,DISP=SHR
```

Note: If the QMF load library is allocated to ISPLLIB, then you cannot allocate QMFHPO.SRAALOAD to STEPLIB. QMFHPO.SRAALOAD must also be allocated to ISPLLIB, before the QMF load library.

Allocation scenario 2

If explicit library allocations for QMF and DB2 libraries currently exist in a user's TSO logon procedure, set the **Automatically LIBDEF and ALTLIB?** configuration parameter to Y (see "Step 12c. Set data set names" on page 242). In this case, there is no need to add explicit library allocations to the TSO logon procedure.

Allocation scenario 3

If QMF and DB2 libraries are currently allocated dynamically from within a CLIST or EXEC, set the **Automatically LIBDEF and ALTLIB?** configuration parameter to N (see ""Step 12c. Set data set names" on page 242). Also, add dynamic allocations for the HPO libraries to the same CLIST or EXEC that dynamically allocates QMF and DB2:

```
ISPEXEC LIBDEF ISPMLIB DATASET ID          +
                       ('QMFHPO.SRAAISPM'   +
                        'QMF610.DSQMLIBE'   +
                        'DSN310.SDSNSPFM')
ISPEXEC LIBDEF ISPLLIB DATASET ID          +
                       ('QMFHPO.SRAALOAD')
ISPEXEC LIBDEF ISPPLIB DATASET ID          +
                       ('QMFHPO.SRAAISPP'   +
                        'QMF610.DSQPLIBE'   +
                        'DSN310.SDSNSPFP')
ALTLIB ACTIVATE APPLICATION(CLIST) DATASET +
                       ('QMFHPO.SRAACLST'   +
                        'QMFHPO.SRAAEXEC'   +
                        'QMF610.DSQCLSTE'   +
                        'DSN310.SDSNCLIST')
```

Allocation scenario 4

If QMF and DB2 libraries are currently allocated dynamically from within a CLIST or EXEC, set the **Automatically LIBDEF and ALTLIB?** configuration parameter to Y (see "Step 12c. Set data set names" on page 242). Also, you must modify the member named RAAALLOC in QMFHPO.SRAACLST. RAAALLOC must contain all of the dynamic library allocations (with the UNCOND parameter) for HPO, QMF, and DB2:

```
SET &QMFCLIST = &STR('QMF610.DSQCLSTE')
SET &QMFMLIB = &STR('QMF610.DSQMLIBE')
SET &QMFPLIB = &STR('QMF610.DSQPLIBE')
SET &DB2CLIST = &STR('DSN310.SDSNCLIST')
SET &DB2MLIB = &STR('DSN310.SDSNSPFM')
SET &DB2PLIB = &STR('DSN310.SDSNSPFP')
```

The RAAALLOC CLIST will use these variables to perform the appropriate LIBDEFs and ALTLIBs for HPO, QMF, and DB2 libraries. However, as noted above, the QMF and DB2 load libraries cannot be allocated with a LIBDEF for ISPLLIB. If the CLIST or EXEC you were previously using to allocate QMF and DB2 libraries used a dynamic STEPLIB facility to allocate the load libraries, you should manually add the necessary commands to perform the same function in the RAAALLOC CLIST.

Step 4b. Special allocations for The HPO/Governor Module

Skip this step if you are **not** using Manager.

The HPO/Governor Module runs **under** QMF. As a result, allocations for HPO libraries are not necessarily in effect. For the proper functioning of this module, you must ensure that the following allocations are in place for users who will be governed, logged, monitored, or analyzed by The HPO/Governor Module-there is no support for performing these allocations automatically.

```
//ISPLLIB    DD    DSN=QMFHPO.SRAALOAD,DISP=SHR
//           DD    DSN=QMF610.DSQLOAD,DISP=SHR
//ISPPLIB    DD    DSN=QMFHPO.SRAAISPP,DISP=SHR
//SYSPROC    DD    DSN=QMFHPO.SRAACLST,DISP=SHR
//           DD    DSN=QMFHPO.SRAAEXEC,DISP=SHR
//RAADEBUG   DD    SYSOUT=A,
//               DCB=(RECFM=FBA,LRECL=121,BLKSIZE=1210)
```

Note: QMFHPO.SRAALOAD must be allocated before the QMF load library.

Note: If the QMF load library is allocated to ISPLLIB, then you cannot allocate QMFHPO.SRAALOAD to STEPLIB. QMFHPO.SRAALOAD must also be allocated to ISPLLIB, before the QMF load library.

Step 4c. Special allocations for Compiler-generated programs

Skip this step if you are **not** using Compiler.

Users who will be running programs generated by Compiler must have the following libraries allocated-there is no support for performing these allocations automatically:

```
//ISPMLIB    DD    DSN=QMFHPO.SRAAISPM,DISP=SHR
//ISPPLIB    DD    DSN=QMFHPO.SRAAISPP,DISP=SHR
//SYSEXEC    DD    DSN=QMFHPO.SRAAEXEC,DISP=SHR
//ISPLLIB    DD    DSN=QMFHPO.SRAALOAD,DISP=SHR
```

Step 5. Customize The HPO/Governor Module Help Panel

Skip this step if you are **not** using Manager.

You can enable a help panel to be displayed if The HPO/Governor Module cancels a command. This panel will be displayed if the end user presses PF1 (or enters the HELP command) after a cancellation message appears.

Two things must be done to activate this new panel:
- Edit the member named RAAQMFH found in QMFHPO.SRAAISPP. RAAQMFH, as provided, is a sample and can be modified as desired for your site. The text in the panel body is completely customizable. For example, you may want this panel to notify the end user of a help desk phone number to call when a QMF command is canceled.

- Make sure that the **Enable The HPO/Governor Module Help Panel?** configuration parameter is set to Y (see "Step 12f. Set The HPO/Governor Module configuration parameters" on page 245).

Step 6. Customize compile CLIST

Skip this step if you are **not** using Compiler.

If your site is using VS COBOL II Release 1 or Release 2, modify the member named RAADSNH in QMFHPO.SRAACLST, changing all occurrences of TRUNC(BIN) with NOTRUNC.

If this modification is omitted, VS COBOL II programs will not compile.

Step 7. Verify DSNH CLIST

Skip this step if you are **not** using Compiler.

Compiler invokes the DB2 CLIST named DSNH. Verify that DSNH is installed and working properly. See *DB2 Command and Utility Reference* for a discussion of DSNH.

If DSNH is not installed and working properly, online program preparation will not work.

Step 8. Customize post-generation CLIST

Skip this step if you are **not** using Compiler.

Standard post-generation modifications can be made to generated source code by modifying the member named RAAPOSTG in QMFHPO.SRAACLST. For example, this CLIST can easily be used to apply an ISPF edit macro to the generated source code. (A sample edit macro CLIST named RAAPOSTM is also provided.)

The RAAPOSTG CLIST is invoked by Compiler after the program has been generated and before any of the post-generation action flags are processed.

You can add your own code to the supplied RAAPOSTG (and RAAPOSTM) CLIST. However, when new releases of Compiler are introduced, you will need to repeat these modifications.

Step 9a. Customize Compiler JCL skeletons

Skip this step if you are **not** using Compiler.

These members, found in QMFHPO.SRAASKEL, contain skeleton JCL:

RAACC: The CICS library names are assumed to follow the SDFH naming convention as adopted beginning with CICS 3.2. If you will be compiling programs for earlier versions of CICS, modify the three lines in this member which read:

```
 DSN=#AACICSPR#.SDFHLOAD
 DSN=#AACICSPR#.SDFHLOAD
 DSN=#AACICSPR#.SDFHCOB
```

This skeleton JCL supports the compiling of OS/VS COBOL and VS COBOL II programs only. If you are using AD/Cycle COBOL/370 or COBOL for MVS, you must perform any customization necessary for those products.

RAACR: Add an appropriate JOBLIB card to this JCL to identify the library that contains your site's sort program. This is not necessary if the sort program exists in a link list library.

This skeleton JCL supports the compiling of OS/VS COBOL and VS COBOL II programs only. If you are using AD/Cycle COBOL/370 or COBOL for MVS, you must perform any customization necessary for those products.

RAAENDUJ: Modify the default job cards found at the beginning of this member. These default cards will be used if a user does not specify any when running a program.

Step 9b. Customize Manager JCL skeletons

Skip this step if you are **not** using Manager.

This member, found in QMFHPO.SRAASKEL, contains skeleton JCL:

RAAOMLD: Add an appropriate JOBLIB card to this JCL to identify the library which contains your site's sort program. This is not necessary if the sort program exists in a link list library.

Configuring HPO

You must specify configuration values for each DB2 subsystem with which you use HPO.

Step 10. Preparing for configuration

The configuration parameters are set by executing the HPO Configuration Dialog.

If you have not previously configured QMF HPO Version 6 Release 1, the HPO Configuration Dialog will question whether QMFHPO.SRAAISPM,

QMFHPO.SRAAISPP, QMFHPO.SRAACLST, QMFHPO.SRAAEXEC, and
QMFHPO.SRAALOAD have been allocated to your session. If these libraries
have been allocated, then simply respond Y to the prompt.

If these libraries have not been allocated, then respond N to the initial prompt
and specify the library names to the subsequent prompts. The HPO
Configuration Dialog will dynamically allocate QMFHPO.SRAAISPM,
QMFHPO.SRAAISPP, and QMFHPO.SRAALOAD using the ISPF LIBDEF
service and QMFHPO.SRAACLST and QMFHPO.SRAAEXEC using the TSO
ALTLIB command.

Step 11. Invoke the HPO Configuration Dialog

You invoke the HPO Configuration Dialog by issuing the following TSO
command:

```
CALL 'QMFHPO.SRAALOAD(RAAMAIN)' 'CONFIG'
```

```
HPO Configuration Dialog Selection Menu -------------------------------- 6.1.0
ENTER SELECTION ===>

                                            DB2 ID   ===> DB2P

                                            User ID:
                                            Date:
                                            Time:
--------------------------------------------------------------------------------

    1  Configure One DB2 Subsystem
    2  Bind Application Plans For One DB2 Subsystem
    3  Bind Packages At One Location
    X  Exit


--------------------------------------------------------------------------------
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--------------------------------------------------------------------------------
```

Note: After creating or changing configuration information, you must log off
TSO and then log back on for the changes to take effect.

Note: During the configuration process, the following informational messages
(which are completely normal and can be ignored) may be written to
your terminal:

```
CSV003I  REQUESTED MODULE RAAXxxxx NOT FOUND
```

```
CSV028I JOBNAME=xxxxxxxx STEPNAME=xxxxxxxx
```

These messages can be suppressed by issuing the following TSO command:

```
PROFILE NOWTPMSG
```

Step 12. Configure one DB2 subsystem

Once you select option 1, the configuration process begins for the specified DB2 subsystem. If this subsystem has been configured before, the current configuration parameters will be displayed. If this subsystem has not been configured before, but another subsystem has, then the most recent configuration parameters specified will be displayed. If no subsystems have been configured yet, configuration defaults will be displayed.

If at any point the dialog is terminated prematurely (by pressing PF3 or typing CAN or CANCEL), none of the parameters for this DB2 subsystem will be saved and you will return to the HPO Configuration Dialog Selection Menu.

```
DB2P -- General Configuration Parameters ------------------------------ 6.1.0
COMMAND ===>

Press ENTER to proceed to the next configuration panel.
Type CAN or CANCEL or press PF3 to cancel configuration.

1. DB2 Version And Release.. ===>

2. QMF Version And Release.. ===>
3. Default Translation...... ===>

4. Default Job Parameters...
        CLASS................. ===>
        MSGCLASS.............. ===>
        SYSOUT CLASS.......... ===>
        DEST.................. ===>
        Temporary Data Set Unit ===>
```

Step 12a. Set general configuration parameters

If you press Enter, the next panel will be displayed. If you press PF3, you will return to the HPO Configuration Dialog Selection Menu and the configuration parameters will not be saved.

The fields on the panel are:

DB2 Version And Release
Enter the version and release of this DB2 subsystem. Valid values are `2.2, 2.3, 3.1, 4.1, 5.1,`or `6.1`.

QMF Version And Release
Enter the version and release of the QMF installation running under this subsystem. Valid values are `2.3, 2.4, 3.1.0, 3.1.1, 3.2, 3.3,` or `6.1.0`.

Default Translation

Enter the default value to use for Translation for this QMF installation. Valid values are `ENGLISH, UPPERCASE, FRANCAIS CANADIEN, SIMPLIFIED CHINESE, T-CHINESE, DANSK, FRANCAIS, DEUTSCH, ITALIANO, NIHONGO, HANGEUL, PORTUGUES, ESPANOL, SVENSKA, FRANCAIS (SUISSE)`, and `DEUTSCH (SCHWEIZ)`.

Default CLASS

Enter the default value to be used by Program Generator and the End User Facility for the CLASS parameter when tailoring JCL to run report programs.

Default MSGCLASS

Enter the default value to be used by Program Generator and the End User Facility for the MSGCLASS parameter when tailoring JCL to run report programs.

Default SYSOUT CLASS

Enter the default value to be used by Program Generator and the End User Facility for the SYSOUT parameter on the REPORTnn DDs when tailoring JCL to run report programs.

Default DEST

Enter the default value to be used by Program Generator and the End User Facility for the DEST parameter on the REPORTnn DDs when tailoring JCL to run report programs. If you leave this field blank, no DEST will be specified.

Temporary Data Set Unit

Enter a work unit (for example, `SYSDA`) to be used when creating temporary data sets. Do not enter a VIO unit.

Step 12b. Set plan names

```
DB2P -- Plan Names -------------------------------------------------- 6.1.0
COMMAND ===>

Press ENTER to proceed to the next configuration panel.
Type CAN or CANCEL or press PF3 to cancel configuration.

1. QMF (Optional)................... ===>

Compiler...
2. Program Generator................ ===>
3. End User Facility for TSO........ ===>
4. End User Facility for CICS....... ===>

Manager...
5. Object Manager for Administrators ===>
6. Object Manager for Users......... ===>
7. Governor......................... ===>
8. The HPO⁄Governor Module.......... ===>
```

If you press Enter, the next panel will be displayed. If you press PF3, you will
return to the HPO Configuration Dialog Selection Menu and the configuration
parameters will not be saved.

The fields on the panel are:

QMF Enter the name of the QMF application plan. If you leave this field
blank, the system default will be used.

Program Generator
Enter the name of the Program Generator application plan.

End User Facility For TSO
Enter the name of the End User Facility for TSO application plan.

End User Facility For CICS
Enter the name of the End User Facility for CICS application plan.

Object Manager For Administrators
Enter the name of the Object Manager for Administrators application
plan.

Object Manager For Users
Enter the name of the Object Manager for Users application plan.

Governor
Enter the name of the Governor application plan.

The HPO/Governor Module
> Enter the name of The HPO/Governor Module application plan.

Step 12c. Set data set names

```
DB2P -- Data Set Names ------------------------------------------------ 6.1.0
COMMAND ===>

Press ENTER to proceed to the next configuration panel.
Type CAN or CANCEL or press PF3 to cancel configuration.

1. Automatically LIBDEF and ALTLIB? (Y/N) ===>

2. Data Set Names...
     DBRM Library.... ===>
     Skeleton Library ===>
     Load Library.... ===>
     Message Library. ===>
     Panel Library... ===>
     CLIST Library... ===>
     EXEC Library.... ===>
     Source Library.. ===>
```

If you press Enter, the next panel will be displayed. If you press PF3, you will return to the HPO Configuration Dialog Selection Menu and the configuration parameters will not be saved.

The fields on the panel are:

Automatically LIBDEF and ALTLIB?
> Enter Y to automatically LIBDEF to the specified message, panel, and load libraries and ALTLIB to the specified CLIST and EXEC libraries on entry. Enter N if this function should not be performed. See "Step 4a. Allocating libraries" on page 232 for more information.

Data Set Names
> Enter the name of each of the listed libraries.

Step 12d. Set optional Program Generator data set names

```
DB2P -- Program Generator Data Set Names -------------------------------- 6.1.0
COMMAND ===>
Press ENTER to proceed to the next configuration panel.
Type CAN or CANCEL or press PF3 to cancel configuration.

Default User Libraries (Optional)...
1. Query Library.... ===>
2. Form Library..... ===>
3. Procedure Library ===>
4. Source Library... ===>
5. DBRM Library..... ===>
6. Load Library..... ===>
```

If you press Enter, the next panel will be displayed. If you press PF3, you will
return to the HPO Configuration Dialog Selection Menu and the configuration
parameters will not be saved.

The fields on the panel are:

Default User Libraries (Optional)
> Enter the default value to use for each of the listed Program
> Generator data sets. These values are used only when a user enters
> Program Generator for the first time. Do not enter the names of
> restricted system data sets because users must be able to write to
> these data sets. If any of these data sets do not exist, a subsequent
> panel will be displayed, allowing you to allocate them. If you leave
> any of these fields blank, the corresponding fields in Program
> Generator will be blank when a user enters Program Generator for the
> first time.

Step 12e. Set Program Generator parameters

These parameters are used by Program Generator when preparing generated
programs. Any of the fields except for **Use Custom Compile?** may be left
blank. However, if they are left blank, Program Generator will use the default
names found in DSNH (the DB2 program preparation CLIST) when
performing online compiles, and will not specify them at all when performing
batch compiles.

```
DB2P -- Program Generator Parameters ---------------------------------- 6.1.0
COMMAND ===>

Press ENTER to proceed to the next configuration panel.
Type CAN or CANCEL or press PF3 to cancel configuration.

1. Use Custom Compile? (Y∕N) ===>

2. DB2 Data Sets (Optional)...
       Precompiler. ===>
       Load Library ===>
3. OS∕VS COBOL Data Sets (Optional)...
       Compiler.... ===>
       Load Library ===>
4. VS COBOL II, AD∕Cycle COBOL∕370, or COBOL for MVS Data Sets (Optional)...
       Compiler.... ===>
       Load Library ===>
       CICS Library ===>
5. CICS Data Sets (Optional)...
       DSN Prefix.. ===>
6. GDDM Data Sets (Optional)...
       Load Library ===>
```

If you press Enter, the next panel will be displayed. If you press PF3, you will
return to the HPO Configuration Dialog Selection Menu and the configuration
parameters will not be saved.

The fields on the panel are:

Use Custom Compile?
>Enter Y to have Program Generator bypass all panel displays
associated with preparing a program, and instead to immediately
invoke the RAADSNH CLIST to prepare a program. (RAADSNH
must then be customized to invoke a local prepare∕compile facility.)
Enter N to use Program Generator's native facilities.

DB2 Precompiler
>Identify the DB2 precompiler (both data set and member). For
example, 'SYS1.DSN230.DSNLOAD(DSNHPC)'.

DB2 Load Library
>Identify the DB2 load library (data set only). For example,
'SYS1.DSN230.DSNLOAD'.

OS∕VS COBOL Compiler
>Identify the OS∕VS COBOL compiler (both data set and member). For
example, 'SYS1.COBLOAD(IKFCBL00)'.

OS∕VS COBOL Load Library
>Identify the OS∕VS COBOL load library (data set only). For example,
'SYS1.COBLIB'.

VS COBOLII, AD/Cycle COBOL/370, or COBOL for MVS Compiler
Identify the VS COBOL II, AD/Cycle COBOL/370, or COBOL for MVS compiler (both data set and member). For example, `'SYS1.COB2COMP(IGYCRCTL)'`.

VS COBOL II, AD/Cycle COBOL/370, or COBOL for MVS Load Library
Identify the VS COBOL II, AD/Cycle COBOL/370, or COBOL for MVS load library (data set only). For example, `'SYS1.COB2LIB'`.

VS COBOL II, AD/Cycle COBOL/370, or COBOL for MVS CICS Library
Identify the VS COBOL II, AD/Cycle COBOL/370, or COBOL for MVS CICS load library (data set only). For example, `'SYS1.COB2CICS'`.

CICS DSN Prefix
Identify the prefix for the names of the CICS libraries. For example, `SYS1.CICS`. This field is validated by checking for the existence of either a CICS .LOADLIB library or a .SDFHLOAD library.

GDDM Load Library
Identify the GDDM load library (data set only). For example, `'SYS1.GDDM.SADMMOD'`.

Step 12f. Set The HPO/Governor Module configuration parameters

These parameters are used in QMF by The HPO/Governor Module for object tracking, monitoring, and customized help processing.

```
DB2P -- The HPO/Governor Module Configuration -------------------------- 6.1.0
COMMAND ===>

Press ENTER to proceed to the next configuration panel.
Type CAN or CANCEL or press PF3 to cancel configuration.

1. HPO Activity Log Data Set Names...
      TSO Activity......... ===>
      TSO SQL Text......... ===>
      CICS Activity........ ===>
      CICS SQL Text........ ===>
      Sort/Merge........... ===>
      Activity Archive..... ===>
      SQL Text Archive..... ===>
2. CICS Transient Data Queue Names...
      CICS Activity Log.... ===>
      CICS SQL Text Log.... ===>
3. VSAM File Names...
      Monitor.............. ===>
4. CPU Time Threshold for SQL Text Monitoring (in seconds) ===>
5. Enable The HPO/Governor Module Help Panel? (Y/N)....... ===>
```

If you press Enter, the next panel will be displayed.

If you press PF3, you will return to the HPO Configuration Dialog Selection Menu and the configuration parameters will not be saved.

The fields on the panel are:

TSO Activity

Enter the name of the data set to which Object Manager should log all activity against QMF objects under TSO. If you leave this field blank, no logging will be performed. If the data set exists, it must have DSORG=PS, RECFM=FB, LRECL=80. If it does not exist, a subsequent panel will be displayed, allowing you to allocate it.

TSO SQL Text

Enter the name of the data set to which Object Manager should log SQL text associated with the run of a QMF query under TSO. This logging is conditional, depending on the value of **CPU Time Threshold for SQL Text Monitoring** specified on this panel. If you leave this field blank, no logging will be performed. If the data set exists, it must have DSORG=PS, RECFM=VB, LRECL=3600, and BLKSIZE=3604. If it does not exist, a subsequent panel will be displayed, allowing you to allocate it.

CICS Activity

Enter the name of the data set to which Object Manager should log all activity against QMF objects under CICS. If you leave this field blank, no logging will be performed. If the data set exists, it must have DSORG=PS, RECFM=FB, LRECL=80. If it does not exist, a subsequent panel will be displayed, allowing you to allocate it.

Note: CICS object tracking is activated by the specification of the above CICS dataset names in conjunction with 1) the existence of a QMF HPO resource group assigned to the CICS user and 2) the specification of a DB2 subsystem ID for that DB2 location within the assigned resource group (see "Resource group common controls" on page 140.)

CICS SQL Text

Enter the name of the data set to which Object Manager should log SQL text associated with the run of a QMF query under CICS. This logging is unconditional. However, if you leave this field blank, no logging will be performed. If the data set exists, it must have DSORG=PS, RECFM=VB, LRECL=3600, and BLKSIZE=3604. If it does not exist, a subsequent panel will be displayed, allowing you to allocate it.

Sort/Merge

Enter the name of the data set to be used during the processing of the TSO and CICS activity log data sets. If a data set was specified for either of the TSO or CICS activity logs, this field must be specified.

Otherwise, it is not used. If the data set exists, it must have DSORG=PS, RECFM=FB, LRECL=80. If it does not exist, a subsequent panel will be displayed, allowing you to allocate it.

Activity Archive

Enter the name of the data set in which to archive object activity information from the TSO and CICS activity log data sets after processing them. If a data set was specified for either of the TSO or CICS activity logs, this field must be specified. Otherwise, it is not used. If the data set exists, it must have DSORG=PS, RECFM=FB, LRECL=80. If it does not exist, a subsequent panel will be displayed, allowing you to allocate it.

SQL Text Archive

Enter the name of the data set in which to archive SQL text information from the TSO and CICS SQL text log data sets after processing them. If a data set was specified for either of the TSO or CICS SQL text logs, this field must be specified. Otherwise, it is not used. If the data set exists, it must have DSORG=PS, RECFM=VB, LRECL=3600, and BLKSIZE=3604. If it does not exist, a subsequent panel will be displayed, allowing you to allocate it.

Activity Log

Enter the DCT name that defines this DB2 subsystem's HPO Activity Log for CICS activity.

SQL Text Log

Enter the DCT name that defines this DB2 subsystem's HPO Activity Log for CICS SQL text.

Monitor File

If Monitor will be used, enter the name of the CLUSTER component of the VSAM data set that it uses. This data set must already have been created using the procedures described in "Step 3. Create Monitor VSAM file" on page 232. If Monitor will not be used, this field should be left blank.

CPU Time Threshold For SQL Text Monitoring

This field is ignored if the HPO Activity Log Data Set Name for TSO SQL Text is left blank. Enter a CPU time threshold value which will determine whether or not SQL text associated with the run of a query will be logged to the TSO SQL text activity log. If the amount of CPU time consumed by a query exceeds this value, its SQL text will be logged. Otherwise, it will not be logged. If you enter `0`, all SQL text will be logged. `Under CICS, SQL text is always logged.`

Enable The HPO/Governor Module Help Panel?

Enter `Y` to activate The HPO/Governor Module Help Panel whenever The HPO/Governor Module cancels a QMF command.

Step 12g. Build the HPO configuration modules

After all of the configuration parameters have been specified, the dialog is
ready to build the HPO configuration modules. The Select Action Mode panel
is used to select the mode (foreground or batch) in which this action should
be performed. If foreground is selected, the HPO configuration modules will
be assembled and link-edited online while you wait. If batch is selected, JCL
to perform the assemble and link-edit is generated and submitted.

```
DB2P -- Select Action Mode -------------------------------------------- 6.1.0
COMMAND ===>

Press ENTER to perform this action.
Type CAN or CANCEL or press PF3 to cancel this action.

Mode.................. ===>    (F=Foreground, B=Batch)


If selecting batch, specify the following parameters:

1. Job Cards...
   ===>
   ===>
   ===>
   ===>

2. Write JCL To...
   Data Set........... ===>
   Member............. ===>

3. Edit or Submit JCL? ===>   (E=Edit, S=Submit)
```

If you press Enter and Mode is set to F, the HPO configuration modules will
be assembled and link-edited online while you wait. After this action has
completed, you will return to the HPO Configuration Dialog Selection Menu.

If you press Enter and Mode is set to B, JCL to perform this action will be
generated and either edited or submitted. After this action has completed, you
will return to the HPO Configuration Dialog Selection Menu.

If you press PF3, you will return to the HPO Configuration Dialog Selection
Menu and the configuration parameters will not be saved.

The fields on the panel are:

Mode   Enter F to build the configuration modules online. Enter B to generate
JCL to build the configuration modules in batch.

Job Cards

Enter valid job cards for the job. At least one line must be entered. Any lines specified will be used exactly as entered in the generated JCL.

Data Set

Enter the data set to which the generated JCL should be written. The data set must exist. If the name is enclosed in single quotes, it is taken to be a fully qualified TSO data set name. Otherwise, your current TSO profile prefix is used to qualify the name. If it is a PDS, do not specify a member name here; use the **Member** field. You can also enter the name *TEMP to specify that a temporary data set should be created for the JCL.

Member

If the specified **Data Set** is a PDS, enter the name of the member to which the generated JCL should be written. If the `Data Set` is not a PDS or is *TEMP, this field must be left blank.

Edit or Submit JCL?

Enter E to edit the generated JCL or S to automatically submit it after it is generated.

Step 13. Select application plans to bind

After the DB2 subsystem is configured, you need to bind the application plans. When you select option 2 from the HPO Configuration Dialog Selection Menu, the following panel is displayed:

```
DB2P -- Bind Application Plans ----------------------------------------- 6.1.0
COMMAND ===>

Select the plans to bind by entering Y or N next to each plan name.
Press ENTER to bind the selected plans.
Type CAN or CANCEL or press PF3 to cancel.

Optional Collection ID for BIND PKLIST Parameter ===>
BIND OWNER Parameter........................... ===>

     Component                                   Plan Name  Bind Plan? (Y/N)
     ----------------------------------------    ---------  ----------------
1. Compiler: Program Generator..............
2. Compiler: End User Facility for TSO.......
3. Compiler: End User Facility for CICS......
4. Manager: Object Manager for Administrators
5. Manager: Object Manager for Users........
6. Manager: Governor.........................
7. Manager: The HPO/Governor Module.........
NOTE: Your current authorization ID (or the specified BIND owner) must have
      authority to bind the selected plans, and to execute the SQL contained
      in those plans.
```

If you press Enter, the next panel will be displayed.

If you press PF3, you will return to the Configuration Dialog Selection Menu and the plans will not be bound.

The fields on the panel are:

Optional Collection ID for BIND PKLIST Parameter
> Enter the collection ID to use in the PKLIST parameter of the BIND PLAN command. The packages must be bound into this collection ID at all locations that will be accessed remotely. This field will only be displayed for DB2 Version 2 Release 3 or higher. **It must be left blank if you are not running DDF in this subsystem.**

BIND OWNER Parameter
> Enter the desired OWNER parameter for the BIND PLAN command. If you leave this field blank, the OWNER parameter will not be specified on the BIND.

Step 13a. Bind the plans

After all of the bind parameters have been specified, the dialog is ready to bind the application plans. The Select Action Mode panel is used to select the mode (foreground or batch) in which this action should be performed. If foreground is selected, the plans will be bound while you wait. If batch is selected, JCL to perform the bind is generated and submitted.

```
DB2P -- Select Action Mode ---------------------------------------------- 6.1.0
COMMAND ===>

Press ENTER to perform this action.
Type CAN or CANCEL or press PF3 to cancel this action.

Mode.................. ===>    (F=Foreground, B=Batch)


If selecting batch, specify the following parameters:

1. Job Cards...
     ===>
     ===>
     ===>
     ===>

2. Write JCL To...
     Data Set........... ===>
     Member............. ===>

3. Edit or Submit JCL? ===>    (E=Edit, S=Submit)
```

If you press Enter and Mode is set to F, the plans will be bound online while you wait. The HPO Configuration Dialog invokes the CLIST named RAABIND (found in QMFHPO.SRAACLST) to perform the online bind. You can review RAABIND to ensure that the BIND parameters are consistent with your site's standards. After this action has completed, you will return to the HPO Configuration Dialog Selection Menu.

If you press Enter and Mode is set to B, JCL to perform the bind in batch will be generated and either edited or submitted. This JCL also invokes the CLIST named RAABIND. After this action has completed, you will return to the HPO Configuration Dialog Selection Menu.

If you press PF3, you will return to the HPO Configuration Dialog Selection Menu and the plans will not be bound.

The fields on the panel are:

Mode   Enter F to perform the bind online. Enter B to generate JCL to perform the bind in batch.

Job Cards
Enter valid job cards for the job. At least one line must be entered. Any lines specified will be used exactly as entered in the generated JCL.

Data Set
Enter the data set to which the generated JCL should be written. The data set must exist. If the name is enclosed in single quotes, it is taken to be a fully qualified TSO data set name. Otherwise, your current TSO profile prefix is used to qualify the name. If it is a PDS, do not specify a member name here; use the **Member** field. You can also enter the name *TEMP to specify that a temporary data set should be created for the JCL.

Member
If the specified **Data Set** is a PDS, enter the name of the member to which the generated JCL should be written. If the `Data Set` is not a PDS or is *TEMP, this field must be left blank.

Edit or Submit JCL?
Enter E to edit the generated JCL or S to automatically submit it after it is generated.

Step 14. Select packages to bind

After the DB2 subsystem is configured, you can bind the packages. Only the packages for the components you will be using should be bound. The packages should be bound at each location that will be accessed remotely.

When you select option 3 from the HPO Configuration Dialog Selection
Menu, the following panel is displayed:

```
DB2P -- Bind Packages -------------------------------------------------- 6.1.0
COMMAND ===>

Select the packages to bind by entering Y or N next to each component name.
Press ENTER to bind the packages for the selected components.
Type CAN or CANCEL or press PF3 to cancel.


Location........... ===>
Collection ID....... ===>
BIND OWNER Parameter ===>

     Component                                       Bind Packages? (Y/N)
     ---------------------------------------- --------------------
1. Compiler: Program Generator............... ===>
2. Manager: Object Manager for Administrators ===>
3. Manager: Object Manager for Users......... ===>
4. Manager: Governor......................... ===>
5. Manager: The HPO/Governor Module.......... ===>


NOTE: Your current authorization ID (or the specified BIND owner) must have
       authority to bind the selected packages, and to execute the SQL
       contained in those packages.
```

If you press Enter, the next panel will be displayed.

If you press PF3, you will return to the HPO Configuration Dialog Selection
Menu and the packages will not be bound.

The fields on the panel are:

Location
> Enter the location at which to bind the packages. If you leave this
> field blank, the packages will be bound at the local DB2 location.

Collection ID
> Enter the desired collection ID for the packages. Your current
> authorization ID (or the specified BIND OWNER) must have the
> authority to create a package in the specified collection. You should
> specify the same collection ID at all locations.

BIND OWNER Parameter
> Enter the desired OWNER parameter for the BIND PACKAGE
> command. If you leave this field blank, the OWNER parameter will
> not be specified on the BIND.

Step 14a. Bind the packages

After all of the bind parameters have been specified, the dialog is ready to bind the packages. The Select Action Mode panel is used to select the mode (foreground or batch) in which this action should be performed. If foreground is selected, the packages will be bound while you wait. If batch is selected, JCL to perform the bind is generated and submitted.

```
DB2P -- Select Action Mode -------------------------------------------- 6.1.0
COMMAND ===>

Press ENTER to perform this action.
Type CAN or CANCEL or press PF3 to cancel this action.

Mode.................. ===>    (F=Foreground, B=Batch)


If selecting batch, specify the following parameters:

1. Job Cards...
     ===>
     ===>
     ===>
     ===>

2. Write JCL To...
     Data Set........... ===>
     Member............. ===>

3. Edit or Submit JCL? ===>    (E=Edit, S=Submit)
```

If you press Enter and Mode is set to F, the packages will be bound online while you wait. The HPO Configuration Dialog invokes the CLIST named RAABINDP (found in QMFHPO.SRAACLST) to perform the online bind. You can review RAABINDP to ensure that the BIND parameters are consistent with your site's standards. After this action has completed, you will return to the HPO Configuration Dialog Selection Menu.

If you press Enter and Mode is set to B, JCL to perform the bind in batch will be generated and either edited or submitted. This JCL also invokes the CLIST named RAABINDP. After this action has completed, you will return to the HPO Configuration Dialog Selection Menu.

If you press PF3, you will return to the HPO Configuration Dialog Selection Menu and the packages will not be bound.

The fields on the panel are:

Mode Enter F to perform the bind online. Enter B to generate JCL to perform the bind in batch.

Job Cards

Enter valid job cards for the job. At least one line must be entered. Any lines specified will be used exactly as entered in the generated JCL.

Data Set

Enter the data set to which the generated JCL should be written. The data set must exist. If the name is enclosed in single quotes, it is taken to be a fully qualified TSO data set name. Otherwise, your current TSO profile prefix is used to qualify the name. If it is a PDS, do not specify a member name here; use the **Member** field. You can also enter the name *TEMP to specify that a temporary data set should be created for the JCL.

Member

If the specified **Data Set** is a PDS, enter the name of the member to which the generated JCL should be written. If the `Data Set` is not a PDS or is *TEMP, this field must be left blank.

Edit or Submit JCL?

Enter E to edit the generated JCL or S to automatically submit it after it is generated.

Tailoring for CICS

If QMF is being used under CICS or if you intend to use Compiler to generate CICS programs, then you must tailor for CICS. Otherwise, you can skip all of the installation steps relating to CICS.

Note: CICS documentation and your site's CICS administration staff are the authoritative sources for information on how to set up CICS tables and startup JCL.

Step 15a. Define the PPT entries

Skip this step if these PPT entries already exist.

There is a member named RAAPPT in QMFHPO.SRAASAMP that should be used to define the HPO configuration modules to CICS.

The modules are:

RAAX This module is the HPO main configuration module.

RAAXssid

This module is the HPO configuration module for <ssid>, where <ssid> is the DB2 subsystem ID being used with this CICS region. One entry should be created for each desired subsystem.

RAAXPR
   This module is the HPO product registration module.

RAAXTB
   This module is the HPO trial module.

Assemble and link-edit or dynamically define these PPT entries to CICS.

Note: If you are planning on using The HPO/Governor Module for CICS, make sure that the PPT entries for DSQUEGV3 and DXEUEGM are defined to CICS according to the instructions in *Installing QMF on MVS*.

Step 15b. Define the Compiler PPT entries

Skip this step if you are **not** using Compiler.

Skip this step if these PPT entries already exist.

There is a member named RAAPPT1 in QMFHPO.SRAASAMP that should be used to define programs and maps to CICS. The programs and maps are:

RAAEUC: This is the End User Facility main program.

RAAEUCH: This is the End User Facility variable prompt program.

RAAEUM: This is the mapset used by End User Facility for CICS.

RAAM330: This is the mapset used by CICS programs generated by Program Generator.

Assemble and link-edit or dynamically define these PPT entries to CICS.

Step 16. Define the PCT entry

Skip this step if you are **not** using Compiler.

There is a member named RAAPCT in QMFHPO.SRAASAMP that should be used to define the End User Facility transaction to CICS. The supplied transaction ID is RAAE; however, it can be changed to meet site specific requirements.

Assemble and link-edit or dynamically define this PCT entry to CICS.

Step 17. Define the RCT entry

Skip this step if you are **not** using Compiler.

There is a member named RAARCT in QMFHPO.SRAASAMP that should be used to define the End User Facility transaction and DB2 plan to CICS. The supplied transaction ID is RAAE, however it can be changed to meet site specific requirements. The plan name specified in RAARCT is RAADBIO3. If you changed this default plan name during the HPO Configuration Dialog (see "Step 12b. Set plan names" on page 241), modify RAARCT to specify the name you chose.

Assemble and link-edit or dynamically define this RCT entry to CICS.

Note: The supplied example in the RAARCT member is very basic. Refer to *DB2 Administration Guide* for more information about defining RCT entries.

Step 18. Define the HPO Activity Log data sets to CICS

Skip this step if you are **not** using Manager.

Use the following procedure to define the HPO Activity Log data sets to CICS. This procedure must be followed once for each DB2 subsystem that you will be accessing from QMF:

- Add DD statements to the CICS startup JCL for the HPO CICS activity log data set and the CICS SQL text log data set that you specified to the HPO Configuration Dialog (see "Step 12f. Set The HPO/Governor Module configuration parameters" on page 245). You can use any desired DD names. You must allocate these data sets with a disposition of MOD.

- You must specify the relationship between the DD names that you specified above and the DCT names that you specified to the HPO Configuration Dialog (see "Step 12f. Set The HPO/Governor Module configuration parameters" on page 245). In order to do this, modify the RAADCT and RAADCTSD members in QMFHPO.SRAASAMP, specifying the DCT and DD names.

- Assemble and link-edit or dynamically define these DCT entries to CICS.

Step 19. Modify DFHRPL in the CICS startup JCL

You must add QMFHPO.SRAALOAD to the CICS module load library concatenation (DFHRPL):

```
//DFHRPL    DD    ...
//          DD    DSN=QMFHPO.SRAALOAD,DISP=SHR
//          DD    DSN=QMF610.DSQLOAD,DISP=SHR
```

Note: QMFHPO.SRAALOAD must be allocated before the QMF load library.

Completing Installation

There are several final steps that complete the installation process.

Step 20a. Grant EXECUTE authority on the plans

Different types of users require EXECUTE authority on different plans. This table lists the plans to which each type of user must be given access. (The plan names for the listed components are set during the HPO Configuration Dialog.)

Component	QMFAdministrator	QMFProgrammer	QMFEnd User
Compiler: Program Generator	ˮ	ˮ	
Compiler: End User Facility for TSO	ˮ	ˮ	ˮ
Compiler: End User Facility for CICS	ˮ	ˮ	ˮ
Manager: Object Manager for Administrators	ˮ		
Manager: Object Manager for Users	ˮ	ˮ	
Manager: Governor	ˮ		
Manager: The HPO/Governor Module	ˮ	ˮ	ˮ

Step 20b. Grant EXECUTE authority on the packages

Skip this step if you are using DB2 Version 2 Release 2.

Skip this step if you are **not** using the Distributed Data Facility of DB2.

Certain QMF HPO functions can make use of the remote unit of work capability of DB2 to perform remote processing. These components are:

- Program Generator
- Object Manager
- Governor
- The HPO/Governor Module

For these functions to work correctly, users must be granted EXECUTE authority on the packages associated with those components at each desired remote location. To correctly grant EXECUTE authority on the appropriate packages to a particular type of user, follow this procedure:

- Determine on which plans the type of user should be granted EXECUTE authority, as described in "Step 20a. Grant EXECUTE authority on the plans" on page 257.
- Use the tables below to determine which packages correspond to each plan. The packages associated with a given plan vary by the release of QMF.
- Grant EXECUTE authority on those packages to users of that type (at the remote location).

Component	Packages for QMF 2.3
Compiler: Program Generator	RAAFORM2, RAAPROF2, RAAMENDU, RAALOC
Compiler: End User Facility for TSO	n/a
Compiler: End User Facility for CICS	n/a
Manager: Object Manager for Administrators	RAADBIO, RAADB23, RAARMOM3, RAAOM1, RAALOC, RAAMR01B, RAAMR01T, RAAMR02B, RAAMR02T, RAAMR03B, RAAMR03T, RAAMR04B, RAAMR04T, RAAMR05B, RAAMR05T, RAAMR06B, RAAMR06T, RAAMR07B, RAAMR07T, RAAMR08B, RAAMR08T, RAAMR09B, RAAMR09T, RAAMR10B, RAAMR10T
Manager: Object Manager for Users	RAADBIO, RAADB23, RAARMOM3, RAALOC
Manager: Governor	RAADBIO, RAADB23, RAALOC
Manager: The HPO/Governor Module	RAAOBJT, RAALOC

Component	Packages for QMF 2.4
Compiler: Program Generator	RAAFORM2, RAAPROF2, RAAMENDU, RAALOC
Compiler: End User Facility for TSO	n/a
Compiler: End User Facility for CICS	n/a
Manager: Object Manager for Administrators	RAADBIO, RAADB24, RAARMOM3, RAAOM1, RAALOC, RAAMR01B, RAAMR01T, RAAMR02B, RAAMR02T, RAAMR03B, RAAMR03T, RAAMR04B, RAAMR04T, RAAMR05B, RAAMR05T, RAAMR06B, RAAMR06T, RAAMR07B, RAAMR07T, RAAMR08B, RAAMR08T, RAAMR09B, RAAMR09T, RAAMR10B, RAAMR10T
Manager: Object Manager for Users	RAADBIO, RAADB24, RAARMOM3, RAALOC
Manager: Governor	RAADBIO, RAADB24, RAALOC
Manager: The HPO/Governor Module	RAAOBJT, RAALOC

Component	Packages for QMF 3.1
Compiler: Program Generator	RAAFORM2, RAAPROF3, RAAMENDU, RAALOC
Compiler: End User Facility for TSO	n/a
Compiler: End User Facility for CICS	n/a
Manager: Object Manager for Administrators	RAADBIO, RAADB31, RAARMOM3, RAAOM1, RAALOC, RAAMR01B, RAAMR01T, RAAMR02B, RAAMR02T, RAAMR03B, RAAMR03T, RAAMR04B, RAAMR04T, RAAMR05B, RAAMR05T, RAAMR06B, RAAMR06T, RAAMR07B, RAAMR07T, RAAMR08B, RAAMR08T, RAAMR09B, RAAMR09T, RAAMR10B, RAAMR10T
Manager: Object Manager for Users	RAADBIO, RAADB31, RAARMOM3, RAALOC
Manager: Governor	RAADBIO, RAADB31, RAALOC
Manager: The HPO/Governor Module	RAAOBJT, RAALOC

Component	Packages for QMF 3.2 or higher
Compiler: Program Generator	RAAFORM2, RAAPROF3, RAAMENDU, RAALOC
Compiler: End User Facility for TSO	n/a
Compiler: End User Facility for CICS	n/a
Manager: Object Manager for Administrators	RAADBIO, RAADB32, RAARMOM3, RAAOM1, RAALOC, RAAMR01B, RAAMR01T, RAAMR02B, RAAMR02T, RAAMR03B, RAAMR03T, RAAMR04B, RAAMR04T, RAAMR05B, RAAMR05T, RAAMR06B, RAAMR06T, RAAMR07B, RAAMR07T, RAAMR08B, RAAMR08T, RAAMR09B, RAAMR09T, RAAMR10B, RAAMR10T
Manager: Object Manager for Users	RAADBIO, RAADB32, RAARMOM3, RAALOC
Manager: Governor	RAADBIO, RAADB32, RAALOC
Manager: The HPO/Governor Module	RAAOBJT, RAALOC

Note: Package names, unlike plan names, are not customizable.

Step 21. Initialize HPO Activity Log table

Skip this step if you are **not** using Manager.

Follow the instructions below to determine which one of the listed DML members in QMFHPO.SRAASAMP need to be run.

RAADML2A

Run this SQL if you ran RAADDL2A in "Step 1b. Alter HPO Activity Log table" on page 231. This SQL will initialize the new **last-modified** columns in Q.OBJ_ACTIVITY_SUMM.

RAADML2I

Run this SQL if you executed "Step 1a. Create database, tablespaces, tables, and indexes" on page 230 and if you are using QMF 3.1.1 or earlier. You need to make changes to this member before you run it. You must change 'SSID' to the ID of the DB2 subsystem in which you are installing. You must include the single quotes and the value within the quotes must be four characters long, for example, 'DB2 '. This SQL initializes Q.OBJ_ACTIVITY_SUMM with default values for all QMF objects.

RAADML3I

Run this SQL if you executed "Step 1a. Create database, tablespaces, tables, and indexes" on page 230 and if you are using QMF 3.2 or higher. You need to make changes to this member before you run it. You must change 'SSID' to the ID of the DB2 subsystem in which you are installing. You must include the single quotes and the value within the quotes must be four characters long, for example, 'DB2 '. This SQL initializes Q.OBJ_ACTIVITY_SUMM with CREATED, LAST_USED, and MODIFIED values from Q.OBJECT_DIRECTORY. Note: No initialization takes place for objects where any of these columns contain a null value. Because of this, you may want to replace null values in these columns with an initial timestamp value before running RAADML3I.

Step 22. Modify previously generated Compiler programs

Skip this step if you are **not** using Compiler.

Skip this step if you **have not** generated programs with a previous version or release of Compiler.

Skip this step if you **have** generated programs with a previous version or release of Compiler and **have not** enabled the DATETIME option.

Prior to this version/release, programs generated with the DATETIME option were unable to handle the year 2000 (and beyond) for the DATETIME date. Programs generated with the DATETIME option contain an 01 level variable named CURRNT-DATE in the source code, so if the setting of this option is currently unknown for previously generated programs, a source search on CURRNT-DATE will point out the affected programs.

Important: Any new programs generated with this version/release (and all future versions/releases) will correctly handle the year 2000 (and beyond) for the DATETIME date.

To achieve full support of the year 2000 for the DATETIME date you can simply regenerate your programs using this version/release of Compiler. Alternately, you can modify any existing source code according to the instructions below.

For Compiler generated CICS programs:

In the WORKING STORAGE section, find this 01 level for CURRNT-DATE.

```
01  CURRNT-DATE.
    03  FILLER                  PIC X(2) VALUE '19'.
    03  CURRNT-DATE-DATA        PIC X(8).
```

Modify this CURRNT-DATE variable definition to look as follows:

```
01  CURRNT-DATE.
    03  CURRNT-DATE-CC          PIC X(2) VALUE '19'.
    03  CURRNT-DATE-DATA.
        05  CURRNT-DATE-YEAR    PIC X(2).
        05  FILLER              PIC X(1).
        05  CURRNT-DATE-MONTH   PIC X(2).
        05  FILLER              PIC X(1).
        05  CURRNT-DATE-DAY     PIC X(2).
```

Now find the 1901-INIT-DATE-AND-TIME paragraph in the PROCEDURE DIVISION.

Locate the following code:

```
    EXEC CICS FORMATTIME
        ABSTIME(CURRNT-ABSTIME)
        YYMMDD(CURRNT-DATE-DATA)
        DATESEP('-')
        TIME(CURRNT-TIME)
        TIMESEP('.')
    END-EXEC.
```

Add these lines immediately following the above code:

```
    IF CURRNT-DATE-YEAR < '90'
        MOVE '20' TO CURRNT-DATE-CC.
```

For Compiler generated TSO and BATCH programs:

In the WORKING STORAGE section, find this 01 level for CURRNT-DATE.

```
01  CURRNT-DATE             PIC X(10).
```

Modify this CURRNT-DATE variable definition to look as follows:

```
01  CURRNT-DATE.
    03  CURRNT-DATE-CC          PIC X(2).
    03  CURRNT-DATE-YYMMDD      PIC X(8).
```

Now find the 1901-INIT-DATE-AND-TIME paragraph in the PROCEDURE
DIVISION.

Locate the following code:
```
ACCEPT CURRNT-DATE-DATA FROM DATE.
STRING '19'              DELIMITED BY SIZE
       CURRNT-DATE-YEAR  DELIMITED BY SIZE
       '-'               DELIMITED BY SIZE
       CURRNT-DATE-MONTH DELIMITED BY SIZE
       '-'               DELIMITED BY SIZE
       CURRNT-DATE-DAY   DELIMITED BY SIZE
   INTO CURRNT-DATE.
```

Modify the above code as follows:
```
ACCEPT CURRNT-DATE-DATA FROM DATE.
IF CURRNT-DATE-YEAR < '90'
   MOVE '20' TO CURRNT-DATE-CC
ELSE
   MOVE '19' TO CURRNT-DATE-CC.
STRING CURRNT-DATE-YEAR  DELIMITED BY SIZE
       '-'               DELIMITED BY SIZE
       CURRNT-DATE-MONTH DELIMITED BY SIZE
       '-'               DELIMITED BY SIZE
       CURRNT-DATE-DAY   DELIMITED BY SIZE
   INTO CURRNT-DATE-YYMMDD.
```

Step 23. Query Analyzer VSAM files cleanup

Skip this step if you are **not** migrating from a previous version or release of
Manager.

Skip this step if you are installing Manager for the first time.

Previous releases of Query Analyzer have required the use of VSAM datasets
which held DB2 catalog snapshot information. These VSAM datasets are no
longer used and should be deleted. If you have scheduled Query Analyzer
Snapshot JCL running to update these files, this JCL should also be removed
from your scheduler.

Chapter 15. Messages

This chapter contains descriptions for messages prefixed with RAA.

RAAC messages

Messages that begin with RAAC are issued from Program Generator and appear on the message line on ISPF panels.

RAAC002E   Please select one of the options listed below

Explanation: Choose one of the selection options listed on this panel.

RAAC003E   DB2 subsystem ID cannot be left blank

Explanation: You must enter a valid DB2 subsystem ID. This is the subsystem used to execute SQL, to start QMF, to obtain QMF profile information, and to compile and run programs.

RAAC004E   DB2 subsystem * not configured

Explanation: You (or your administrator) must run the HPO Configuration Dialog for the specified DB2 subsystem.

RAAC005E   Unrecognized command

Explanation: The command that you entered on the command line is not valid.

RAAC006E   Specify one of query, query and form, or procedure

RAAC007E   Specify only one of query, query and form, or procedure

Explanation: The input to the generation process must be either a query, a query and form combination, or a linear procedure. Specify only one of these input sources.

RAAC008E   Cannot specify form without query

Explanation: A program cannot be generated from a form only. You must also specify a query.

RAAC009E   * flag must be "Y" (yes) or "N" (no)

Explanation: The only acceptable values for the specified flag are yes or no.

RAAC010E   * data set name cannot be left blank

Explanation: You must enter a data set name for the specified type of object (query, form, procedure, source code, or load module). It may or may not already contain the specified data.

RAAC011E   QMF requires RECFM = F and LRECL = 79

Explanation: QMF requires that data sets into which queries and procedures are exported have RECFM = F and LRECL = 79.

RAAC012E   Member name not allowed for sequential data sets

Explanation: You cannot specify a member name for the data set because it is a sequential data set.

RAAC013E   Member name has invalid syntax

Explanation: The member name that you entered does not conform to PDS member naming rules.

RAAC014E   QMF requires RECFM = V and LRECL between * and 7290

Explanation: QMF requires that data sets into which forms are exported have RECFM = V and LRECL either between 81 and 7290 (for QMF Version 2) or between 161 and 7290 (for QMF Version 3 or higher).

RAAC015E   Data set must have DSORG = PS or PO

Explanation: You must specify the name of a sequential data set or a partitioned data set.

RAAC016E   Profile key must be "T" (TSOID) or "P" (PRIMEID)

Explanation: Under QMF Version 3 or later, your profile can be keyed by either your TSO logon ID or by your primary DB2 authorization ID. Enter the desired value. This flag is ignored under QMF Version 2.

RAAC017E   Translation must be a valid QMF translation value or "*"

Explanation: Enter a valid QMF translation value. Valid values are ENGLISH, UPPERCASE, FRANCAIS CANADIEN, SIMPLIFIED CHINESE, T-CHINESE, DANSK, FRANCAIS, DEUTSCH, ITALIANO, NIHONGO, HANGEUL, PORTUGUES, ESPANOL, SVENSKA, FRANCAIS (SUISSE), and DEUTSCH (SCHWEIZ). If you enter *, the configuration default translation will be used.

RAAC018I   Default values not saved; Cancel request honored

Explanation: Any changes that you made to the default parameter settings have been discarded.

RAAC019I   Default values will be saved

Explanation: Any changes that you made to the default parameter settings will be saved in your ISPF profile.

RAAC020I   Previous QMF command not issued; Cancel request honored

Explanation: The previous export command was bypassed due to your cancel command. The object that was to be exported is assumed to **not** exist in the specified data set.

RAAC021E   Post-generation CLIST RAAPOSTG RC = *

Explanation: The post-generation CLIST named RAAPOSTG did not run successfully.

RAAC022I   Starting QMF; Please wait...

Explanation: Program Generator is starting a QMF session to export objects.

RAAC023I   Exporting object from QMF; Please wait...

Explanation: QMF is exporting the query, form, or procedure. After the export finishes, the specified data set and member will contain the object.

RAAC024E   Previous export command failed; QMF error *

Explanation: The previous export command failed due to an error condition. Common reasons for this are that the QMF object does not exist or that there is a problem with the specified data set and member. See *QMF Messages and Codes* for more information on the specified error number. In addition, the DSQDEBUG file may contain more information.

RAAC025I   Previous QMF export command was successful

Explanation: The previous export command was successful. The specified data set and

member now contain the QMF object.

**RAAC026E   * does not exist due to export
                   failure**

Explanation: A previous export of the specified
object failed (or was canceled). Consequently,
you cannot process the report for that object.

**RAAC027E   * data set does not exist, has been
                   migrated, or is empty**

Explanation: The data set specified for the
object cannot be found or is empty.
Consequently, you cannot process the report for
that object.

RAAC028E   * member * does not exist in PDS

Explanation: The PDS member specified for the
object cannot be found. Consequently, you
cannot process the report for that object.

RAAC029I   Parsing procedure; Please wait...

Explanation: Program Generator is parsing the
procedure to build a list of the reports that it
runs.

**RAAC030E   Member name cannot be left
                   blank for PDS**

Explanation: If you specify a partitioned data
set, you must also specify a member name.

RAAC031E   Missing argument

Explanation: You must specify a report list row
number or the word "PROC" as an argument to
this command. For example, specify COMPILE 1
or COMPILE PROC.

RAAC032E   Invalid argument

Explanation: You specified an invalid argument
with this command. You must specify a report
list row number or the word "PROC" as an
argument to this command. For example, specify
COMPILE 1 or COMPILE PROC.

RAAC033E   Too many arguments

Explanation: Too many arguments were
specified with this command. You must specify
exactly one report list row number or the word
"PROC" as an argument to this command. For
example, specify COMPILE 1 or COMPILE
PROC.

RAAC034E   Argument out of range

Explanation: The row number that you
specified as an argument to this command is
either less than 1 or greater than the number of
rows in the report list.

RAAC035E   Plan name cannot be left blank

Explanation: You must enter an 8 character (or
less) name to be used as the plan name for the
program.

RAAC036E   Plan name has invalid syntax

Explanation: The plan name that you entered
does not conform to plan naming rules.

**RAAC037E   Review flag must be "B" (browse),
                   "E" (edit), or "N" (none)**

Explanation: To browse the specified object, set
this flag to B. To edit the object, set this flag to E.
To do neither, set this flag to N.

**RAAC038E   Browse failed; Data set or
                   member is empty**

Explanation: The data set or member to be
browsed contains no data.

**RAAC039E   Browse failed; Member * not
                   found**

Explanation: The member to be browsed does
not exist.

RAAC040E   Browse failed; Severe error

Explanation: The browse session failed due to a
severe ISPF error.

RAAC041E   Edit failed; Member or data set in use

Explanation: The data set or member is in use and therefore cannot be edited.

RAAC042E   Edit failed; Member * not found

Explanation: The member to be edited does not exist.

RAAC043E   Edit failed; Severe error

Explanation: The edit session failed due to a severe ISPF error.

RAAC044I   No variables found in query or form.I

Explanation: Program Generator did not find any substitution variables in the query or the form, so there are none to edit. Normal processing will continue.

RAAC045I   Variable values not saved; Cancel request honored

Explanation: Any variable value changes that you made were discarded.

RAAC046E   Language must be "1" (OS/VS COBOL) or "2" (VS COBOL II)

Explanation: You can generate OS/VS COBOL or VS COBOL II programs. Choose the one desired for this generation. Since VS COBOL II is source compatible with AD/Cycle COBOL/370 and COBOL for MVS, you should specify "2" if you are using either of those products.

RAAC047E   Environment must be "B" (batch), "T" (TSO), or "C" (CICS)

Explanation: You can generate programs to run either in MVS batch, TSO online, or CICS. Choose the one desired for this generation.

RAAC048E   DB2 connection type must be "C" (CAF) or "T" (TSO)

Explanation: If you set this flag to C, the generated program will connect to DB2 via the call attachment facility. If you set it to T, the generated program will connect to DB2 via the TSO attachment facility. This flag is ignored for CICS programs, which always connect to DB2 via the CICS attachment facility.

RAAC049E   Table name cannot be left blank

Explanation: You must specify a table name when generating a program that will SAVE DATA to a DB2 table or ERASE a DB2 table.

RAAC050E   Language must be "1" (OS/VS COBOL) or "2" (VS COBOL II) with online program

Explanation: You can generate TSO and CICS programs only in OS/VS COBOL or VS COBOL II. Since VS COBOL II is source compatible with AD/Cycle COBOL/370 and COBOL for MVS, you should specify "2" if you are using either of those products.

RAAC051E   Print program can only be specified with display program

Explanation: You can only specify a print program when you are generating a display program. The program that you enter will be invoked when a user enters the PRINT command from the display program.

RAAC052E   Program must be generated before it can be edited

Explanation: You cannot edit a program until it is generated.

RAAC053E   * flag must be "N" (no) with CICS program

Explanation: The specified option is not allowed with CICS programs.

RAAC055E * flag must be "N" (no) with TSO or CICS print program

Explanation: The specified option is not allowed with TSO or CICS print programs.

RAAC056I Generation was bypassed; Cancel request honored

Explanation: Program Generator bypassed the generation process due to your cancel command.

RAAC057I Generating program; Please wait...

Explanation: Program Generator is generating the program. When it is finished, the specified output data set and member will contain the source code.

RAAC058I Program * has been generated

Explanation: The program has been generated in the specified data set and member.

RAAC059E Compile type must be P (prompted), N (non-prompted), or B (batch)

Explanation: If you enter P, the program will be compiled by invoking DB2I, which will lead you through a series of panels to invoke the compilation process. If you enter N, the program will be compiled immediately by invoking the DSNH command online. If you enter B, JCL will be tailored to perform the compile in batch.

RAAC060E Language must be "1" (OS/VS COBOL) or "2" (VS COBOL II)

Explanation: You can compile OS/VS COBOL and VS COBOL II programs using this facility. Since VS COBOL II is source compatible with AD/Cycle COBOL/370 and COBOL for MVS, you should specify "2" if you are using either of those products.

RAAC061E * flag must be "N" (no) with TSO print program

Explanation: The specified option is not allowed with TSO print programs.

RAAC062E Validate parameter must be "BIND" or "RUN"

Explanation: Enter the value to use for the VALIDATE parameter to the BIND PLAN command. See *DB2 Application Programming and SQL Guide* for more information on this parameter. If the SQL in the program you are compiling refers to any DB2 tables that do not exist at compile time, you must specify RUN for the BIND to succeed.

RAAC063E Target data set must be a PDS

Explanation: Load modules can only be created as members of partitioned data sets. You cannot specify a sequential data set as the target for the program.

RAAC064E Error issuing LMINIT on data set

Explanation: A severe ISPF error occurred when issuing the LMINIT service.

RAAC065E Error issuing LMOPEN on data set

Explanation: A severe ISPF error occurred when issuing the LMOPEN service.

RAAC066I Program not compiled; Cancel request honored

Explanation: The program was not compiled due to your cancel command.

RAAC067I Invoking online compile; Please wait...

Explanation: Program Generator is preparing the program online. If the process completes successfully, the program will be ready to run.

RAAC068E   Online compile error; RC = *

Explanation: An error occurred during the online compile. The return code is included in this message. More information should be written to your terminal during the compile. In addition, see the discussion of the DSNH command in *DB2 Command and Utility Reference* for more information about the compile, including how to locate the output from each step.

RAAC069E   Load library must be a PDS

Explanation: You can only run programs from a partitioned data set.

RAAC070E   Load library and program ID cannot both be left blank

Explanation: If you leave the load library blank, Program Generator assumes that the program to be run exists within one of the load libraries allocated to your TSO session. If you leave the program ID blank, Program Generator displays a member list (from the specified load library). You can select the program to run from this list. If you specify both the load library and the program ID, the program is run from the specified load library (the program must exist in the specified library). You cannot leave both of these fields blank.

RAAC071E   Not all job cards may be left blank

Explanation: You must fill in at least one of these fields for the job card. If only one line is required for the job card, use the first line.

RAAC072E   Flag must be "E" (edit) or "S" (submit)

Explanation: To edit the JCL after it is generated, set this flag to E. To submit the JCL automatically after it is generated, set this flag to S. To bypass JCL generation and job submission, enter the END or CANCEL commands.

RAAC073I   Program not run; Cancel request honored

Explanation: The program was not run due to your cancel command.

RAAC074I   Running program; Please wait...

Explanation: The program is running. Please wait for the first page of the report to be displayed.

RAAC075E   Run error; RC = *

Explanation: An error occurred while running the program. The return code is included in this message.

RAAC076E   Member cannot be specified with temporary data set

Explanation: When using temporary data sets to export queries, forms, or procedures, you cannot specify a member name. The temporary data set that Program Generator creates will be a sequential data set.

RAAC077E   Program name has invalid syntax

Explanation: The program name that you entered does not conform to program naming rules.

RAAC078E   Environment must be "B" (batch) or "T" (TSO)

Explanation: You can only run batch or TSO programs using this facility.

RAAC079E   * flag must be "Y" (yes) with TSO print program

Explanation: The specified option is required with TSO print programs.

RAAC080E   * flag must be "Y" (yes) to enable TSO print program

Explanation: The specified option is required with TSO display programs if you specified a print program name.

RAAC081I   JCL submitted

Explanation: Program Generator has submitted JCL to either compile or run a program.

RAAC082E   Error submitting JCL

Explanation: An error occurred while submitting JCL to either compile or run a program. Additional information may be written to the terminal by TSO.

RAAC083E   * flag must be "N" (no) to enable TSO print program

Explanation: The specified option is not allowed with TSO display programs if you specified a print program name.

RAAC084E   Language must be blank, "1" (OS/VS COBOL), or "2" (VS COBOL II)

Explanation: When running a program, you can optionally specify the language the program was written in. This allows Program Generator to allocate the appropriate system libraries to the run (i.e., the OS/VS COBOL or VS COBOL II runtime libraries). Since VS COBOL II is source compatible with AD/Cycle COBOL/370 and COBOL for MVS, you should specify "2" If you are using either of those products.

RAAC085E   Environment must be "B" (batch) or "T" (TSO) with non-SELECT SQL

Explanation: Program Generator does not support non-SELECT SQL in CICS programs.

RAAC087E   Illegal character (') in options

Explanation: The single quote character (') is not allowed in compile or link edit options. Remove the character.

RAAC088E   Program * not generated yet

Explanation: You must generate the program in the specified row of the report list before you can generate a proc program that runs it.

RAAC089E   Program * has different language than proc program

Explanation: The program in the specified row of the report list was generated in a different language than the proc program. All programs run by a proc program must be written in the same language as the proc program.

RAAC090E   Program * has different environment than proc program

Explanation: The program in the specified row of the report list was generated for a different environment than the proc program. All programs run by a proc program must be written for the same environment as the proc program.

RAAC091E   Program * uses different attachment facility than proc program

Explanation: The program in the specified row of the report list was generated to use a different attachment facility than the proc program. All programs run by a proc program must be written to use the same attachment facility as the proc program.

RAAC092E   Temporary data set only allowed when exporting

Explanation: You cannot specify a temporary data set (*TEMP) for a query, form, or procedure data set unless the object is to be exported.

RAAC093E   Temporary data set not allowed in this field

Explanation: You cannot specify a temporary data set (*TEMP) for the data set entered in this field.

RAAC094E   Error creating temporary data set

Explanation: An error occurred while creating a temporary data set. Additional error messages may be written to the terminal.

RAAC095E   No matching objects found

Explanation: No objects matching the specified owner and name were found in the database.

RAAC096E   Select one and only one object

Explanation: You must select one and only one object from each displayed column.

RAAC097E   Use "S" to select an object

Explanation: The character entered in the selection field was not recognized.

RAAC098E   JCL not generated; Cancel request honored

Explanation: The JCL was not generated due to your cancel command.

RAAC099E   DBRM library must be a PDS

Explanation: You must specify a partitioned data set name for the DBRM library. Sequential data sets are not allowed.

RAAC100E   Unexpected internal error *

Explanation: An unexpected error was encountered.

RAAC101E   Memory exhausted

Explanation: Expand your region size.

RAAC102E   Data set does not exist or has been archived/migrated

Explanation: The specified data set could not be found. You must specify the name of a data set that exists and is catalogued.

RAAC103E   Cannot specify member name in this field

Explanation: You cannot specify the member name as part of the data set name. For example, PDS.LIBRARY(MEM) is invalid. On the Set Default Parameters panel, you can leave the member field blank, and Program Generator will automatically build a member name from the object name. On all other panels, you must specify a member.

RAAC104E   Error connecting to DB2 * (RC=* REASON=*)

Explanation: This message may appear while Program Generator is connecting to the specified DB2 subsystem. Check the return code (RC) and reason code (REASON) in *DB2 Messages and Codes*. Also check that the DB2 subsystem ID that you entered is correct.

RAAC105E   Could not open data set *

Explanation: Program Generator could not open the specified data set. Verify that the data set exists, that you have permission to read it, etc.

RAAC106E   Error reading data set *

Explanation: An error occurred while reading the specified data set. Verify that the data set exists, that you have permission to read it, etc.

RAAC107E   Error writing data set *

Explanation: An error occurred while writing the specified data set. Verify that the data set is not full, that you have permission to write it, etc.

RAAC108E   Procedures with logic are not supported

Explanation: You may only specify a linear procedure as input. Procedures with logic are not supported.

RAAC109E   Qualified object name too long

Explanation: Object names must follow QMF object name syntax. The owner can be 8 characters or less and name can be 18 characters or less. A period should be used to delimit the owner and name.

RAAC110I   Too many reports in procedure

Explanation: The specified procedure referred to too many reports. See "Appendix D. Program Generator specifications" on page 317 for the maximum number of reports supported.

RAAC111E   Too many variables in query

Explanation: The specified query referred to too many substitution variables. See "Appendix D. Program Generator specifications" on page 317 for the maximum number of substitution variables supported.

RAAC112E   No reports in procedure

Explanation: Program Generator did not find any reports when parsing the specified procedure. Each PRINT REPORT command in a procedure corresponds to a report. Also, each RUN QUERY command without a succeeding PRINT REPORT command corresponds to a report.

RAAC113E   SQL error reading Q.OBJECT_DIRECTORY

Explanation: An SQL error occurred while reading the Q.OBJECT_DIRECTORY table to build an object selection list. Enter the HELP command to obtain more information about the error.

RAAC114E   SQL error accessing registration tables

Explanation: An SQL error occurred while accessing the report registration tables (Q.REPORTS and Q.REPORT_VARIABLES). Enter the HELP command to obtain more information about the error.

RAAC115E   SQL error retrieving current SQLID

Explanation: An SQL error occurred while retrieving the current SQLID. This is generally indicative of an unrecoverable error (for example, the application plan has been bound incorrectly). Enter the HELP command to obtain more information about the error.

RAAC116E   Error opening plan * (RC=* REASON=*)

Explanation: This message may appear while Program Generator is connecting to DB2. Check the return code (RC) and reason code (REASON) in *DB2 Messages and Codes.* Enter the HELP command to obtain more information about the error.

RAAC117E   Error connecting to location; SQLCODE = *

Explanation: You cannot connect to the specified location from this DB2 subsystem. Enter the HELP command to obtain more information about the error and check with your system or database administrator.

RAAC118E   Error allocating RAAOUT DD to *

Explanation: An error occurred while trying to allocate the RAAOUT DD to the specified output data set. This allocation uses the disposition specified on the Set Default Parameters panel.

RAAC119E Disposition must be "OLD", "SHR", or "MOD"

Explanation: You must specify the disposition to use for the output data set when generating source code.

RAAC120E Error disconnecting from DB2 * (RC=* REASON=*)

Explanation: This message may appear while Program Generator is disconnecting from the specified DB2 subsystem. Check the return code (RC) and reason code (REASON) in *DB2 Messages and Codes.*

RAAC200E Token too long at line * of *

Explanation: A token was found while parsing the procedure data set that exceeded the maximum length. The maximum length for a token in a procedure is 256.

RAAC201E Invalid quoted value at line * of *

Explanation: An invalid token was found while parsing the procedure data set. Verify that the data set contains a valid linear procedure.

RAAC202E Unbound variable at line * of *

Explanation: An unbound variable was found while parsing the procedure data set. Verify the procedure in the data set, possibly replacing variables with constants.

RAAC203E Invalid DSN in IMPORT at line * of *

Explanation: The data set specified in the IMPORT command in the procedure data set is invalid.

RAAC204E Syntax error at line * of *

Explanation: A syntax error was found while parsing the procedure data set.

RAAC205E Variable value too long at line * of *

Explanation: Variable values must be 55 characters or less.

RAAC206E Missing variable value at line * of *

Explanation: Verify the specified procedure data set. Make sure that variable assignments are complete. Do not leave any assignments incomplete, such as RUN QUERY (FORM=.

RAAC207E Integer value out of range at line * of *

RAAC208E Bad integer value at line * of *

Explanation: A positive integer value was expected. A non-integer or an integer that is too large was found.

RAAC209E No query name for RUN at line * of *

Explanation: A RUN command was found that did not reference a query name or QUERY.

RAAC210E Bad value for DATETIME at line * of *

Explanation: An invalid value for the DATETIME parameter of the PRINT command was found. See *QMF Reference* for legal values.

RAAC211E Bad value for PAGENO at line * of *

Explanation: An invalid value for the PAGENO parameter of the PRINT command was found. See *QMF Reference* for legal values.

RAAC212E Unexpected continuation at line * of *

Explanation: An illegal continuation line was found while parsing the procedure data set.

RAAC213E Command too long at line * of *

Explanation: A command was found while parsing the procedure data set that exceeds the maximum procedure command length.

RAAC214E Data type mismatch for variable *

Explanation: The same host variable is referred to more than once, with conflicting data types on different references.

RAAC215E Invalid length for variable * with * type

Explanation: When specifying data type CHAR, you must specify a length within parentheses directly after the data type, for example, :VAR1 CHAR(3). When specifying data type DECIMAL, you may optionally specify a precision or precision and scale after the data type, for example, :VAR1 DECIMAL(5) or :VAR1 DECIMAL(7,2). The precision must be less than or equal to 15 and the scale must be less than or equal to the precision.

RAAC216E Unrecognized type * for variable *

Explanation: Valid data types are INTEGER, SMALLINT, DECIMAL(p,s), DECIMAL(p), DECIMAL, FLOAT, CHAR(n), VARCHAR(n), DATE, TIME, and TIMESTAMP.

RAAC217E Empty variable name

Explanation: When specifying a host variable name, enter a colon (:) followed by the variable name. For example, :VAR1.

RAAC218E Empty indicator name

Explanation: When specifying a host variable indicator name, enter a colon (:) followed by the variable name. For example, :VAR1:IND.

RAAC219E Missing variable type

Explanation: You must supply a data type for each host variable specified.

RAAC220E Error opening RAAVARS DD

Explanation: When you are generating a program in batch from a query or form that uses variables, Program Generator reads values for those variables from the RAAVARS DD. Make sure that the RAAVARS DD is defined and has the correct format.

RAAC221E Invalid record in RAAVARS DD

Explanation: A record read from the RAAVARS DD had an invalid format. Each record must be of the form &VARNAME=VARVALUE

RAAC300E Invalid header record in exported form

Explanation: The specified form data set does not contain a valid QMF form.

RAAC301E Exported form has warnings or errors

Explanation: The specified form data set contains a form that has QMF warnings or errors. To determine what the warnings or errors are, display the form in QMF, and enter the CHECK command.

RAAC302E Exported form is incomplete

RAAC303E Invalid record type * at record * of *

RAAC304E Unexpected T record at record * of *

RAAC305E Invalid T record at record * of *

RAAC306E Unexpected V record at record * of *

RAAC307E Invalid V record at record * of *

RAAC308E **Unexpected R record at record * of**
*****

RAAC309E **Error reading column info at**
record * of *

RAAC310E **Invalid form value at record * of ***

RAAC311E **Invalid BREAK usage code at**
record * of *

Explanation: The specified form data set does
not contain a valid QMF form.

RAAC312E **Environment must be "B" (batch)**
or "T" (TSO) for user edit codes

Explanation: Program Generator does not
support user edit routines (Uxxxx and Vxxxx)
with CICS programs.

RAAC313E **HPO/Runtime must be "Y" (yes)**
for * usage code

Explanation: Program Generator does not
support the ACROSS and CALC usage codes
with standalone programs.

RAAC314E **Invalid form variable at record ***
of *

Explanation: The specified form data set does
not contain a valid QMF form.

RAAC315E **Host variables not supported in**
form text

Explanation: You attempted to replace a
substitution variable with a host variable.
However, that variable is used in the form. All
substitution variables in form text must be
replaced with literals when generating a program
that uses the HPO/Runtime feature.

RAAC316E **Unsupported use of form detail**
variation

Explanation: The exported form contains form
detail variation, which Program Generator does
not support.

RAAC317E **Environment must be "B" (batch)**
or "T" (TSO) for * usage code

Explanation: Program Generator does not
support the xPCT usage codes with CICS
programs.

RAAC400E **Unexpected SQL parsing error**

Explanation: An error occurred while parsing
the query. One possible cause (of many) for this
is that substitution variables in the query have
not been replaced with values. Make sure that all
variables have been replaced by constants,
literals, or host variables (with data types).

RAAC401E **SQL parsing error: non-numeric**
argument to numeric operator

Explanation: A numeric operator with a
non-numeric argument was found while parsing
the query.

RAAC402E **SQL parsing error: non-string**
argument to string operator

Explanation: A string operator with a
non-string argument was found while parsing
the query.

RAAC403E **SQL parsing error: token too long**

Explanation: A token which exceeds the
maximum token length was found while parsing
the query.

RAAC404E **SQL parsing error: invalid**
correlation name

RAAC405E **SQL parsing error: invalid SQL**
object name

RAAC406E   SQL parsing error: SQL object name too long

RAAC407E   SQL parsing error: "*" invalid as SQL object name

Explanation: An invalid name was found while parsing the query.

RAAC408E   SQL parsing error: invalid hexadecimal string constant

Explanation: An invalid hexadecimal string constant (e.g., x'40F') was found while parsing the query.

RAAC409E   SQL parsing error: column found in more than one table

Explanation: A column referred to in the SELECT clause is ambiguous. It should be qualified by a table or correlation name.

RAAC410E   SQL parsing error: column not found in any table

Explanation: A column referred to in the SELECT or ORDER BY clauses cannot be found in any table in the FROM clause.

RAAC411E   SQL parsing error: invalid operator for date/time values

Explanation: Dates and times can only be subtracted, incremented, or decremented. Timestamps can only be incremented or decremented.

RAAC412E   SQL parsing error: invalid lexical token

Explanation: Invalid characters were found while parsing the query.

RAAC413E   Program in row * with * must be generated first

Explanation: The query refers to a table that does not exist. Either there is a preceding query

in the procedure that performs a CREATE TABLE for the nonexistent table, or there is a preceding SAVE DATA command that creates the nonexistent table. In either case, you must generate the program that performs the CREATE TABLE or SAVE DATA before you can generate this program.

RAAC414E   SQL parsing error: invalid column name "*"

Explanation: An asterisk (*) was found as a column name in an illegal position, for example, as DECIMAL(*).

RAAC415E   SQL parsing error: SELECT lists have different number of columns

Explanation: An error occurred while parsing a query that contains a UNION clause. Two subselects that are unioned in the query select a different number of clauses. This is illegal SQL.

RAAC416E   SQL parsing error: column attributes in SELECT lists do not agree

Explanation: An error occurred while parsing a query that contains a UNION clause. Two subselects that are unioned in the query select corresponding columns that have different data types, for examples, INTEGER and DATE. This is illegal SQL.

RAAC417E   SQL parsing error: expected *

Explanation: An error occurred while parsing a query that contains a UNION clause. An invalid token was found when expecting the type of token specified in the message.

RAAC500E   Error preparing SQL statement; SQLCODE = *

Explanation: The query contains an SQL error, indicated by SQLCODE. Enter the HELP command to obtain more information about the error.

RAAC501E Error describing SQL statement; SQLCODE = *

Explanation: The query contains an SQL error, indicated by SQLCODE. Enter the HELP command to obtain more information about the error.

RAAC502E SQL statement not SELECT; Form not allowed

Explanation: You may not specify a form for this query because it is not a SELECT query.

RAAC503E SQL statement too long

Explanation: The query exceeds the maximum length for SQL statements. See "Appendix D. Program Generator specifications" on page 317 for the maximum length of an SQL statement.

RAAC504E Invalid column count after DESCRIBE

Explanation: An unexpected DB2 error occurred. This is usually indicative of an unrecoverable error.

RAAC505E Number of columns in form inconsistent with query

Explanation: The number of columns in the SELECT clause of the query must exactly match the number of columns referred to in the form. This message is also produced if you specify a form that makes use of column definitions.

RAAC506E Unrecognized column type * from DESCRIBE

Explanation: An unexpected column type was received from DB2.

RAAC600E Invalid control statement at line * of *

Explanation: The skeleton code data set contains an invalid control code. Verify that the installation process was successful and complete.

RAAC601E Too many)IF's at line * of *

Explanation: The nesting of)IF's in the skeleton code data set is too great. The maximum nesting level is 10.

RAAC602E Unexpected)ELSEIF at line * of *

Explanation: An)ELSEIF was found in the skeleton code data set without a preceding)IF.RAAC603EUnexpected)ELSE at line * of *An)ELSE was found in the skeleton code data set without a preceding)IF.

RAAC604E Unexpected)ENDIF at line * of *

Explanation: An)ENDIF was found in the skeleton code data set without a preceding)IF.

RAAC605E Unexpected EOF in *

Explanation: The end of the skeleton code data set was reached while processing was still within an)IF or)LOOP.

RAAC606E Specified LRECL is too small; Must be at least *

Explanation: When reading data from or writing data to a sequential file, the LRECL of the DATAIN or DATAOUT DD must be at least as large as the total length of the columns in the SELECT clause and their associated null indicators.

RAAC607E Invalid parameter code at line * of *

RAAC608E Loop too long at line * of *

RAAC609E Illegal nested loop at line * of *

Explanation: The skeleton code data set contains an invalid construct. Verify that the installation process was successful and complete.

RAAC610E **Unexpected)ENDLOOP at line ***
of *

Explanation: An)ENDLOOP was found in the skeleton code data set without a preceding)LOOP.

RAAC611E **Unterminated)IF in loop at line ***
of *

Explanation: An)ENDLOOP was found in the skeleton code data set without an)ENDIF to terminate an)IF within the loop.

RAAC700E **Program not registered; Cancel request honored**

Explanation: The program was not registered due to your cancel command.

RAAC701E **Report owner cannot be left blank**

Explanation: You must specify a report owner when creating a report.

RAAC702E **Report owner must be valid SQLID**

Explanation: You must specify a valid primary or secondary SQLID for the owner of the report. You may also specify an owner of the form T=**tranid** where `tranid` is a valid CICS transaction identifier.

RAAC703E **Report name cannot be left blank**

Explanation: You must specify a report name when creating a report.

RAAC704E **Program must be generated before it can be registered**

Explanation: You cannot register a program until you generate it.

RAAC705I **Program has been registered**

Explanation: T he program has been registered by creating a row in the Q.REPORTS table and (optionally) rows in the Q.REPORT_VARIABLES

table. You can now run the program from the End User Facility.

RAAC706E **Invalid SQLID**

Explanation: You must enter a valid primary or secondary SQLID.

RAAC707E **Please select one of the actions listed below**

Explanation: Choose one of the selection options listed on this panel.

RAAC709E **No matching report(s)**

Explanation: No reports matching the specified owner and name were found in the database.

RAAC710E **Report already exists**

Explanation: A report with the specified owner and name already exists in the database. Specify a different owner or name.

RAAC711I **Report not created; Cancel request honored**

Explanation: The report was not created due to your cancel command.

RAAC712I **Report not updated; Cancel request honored**

Explanation: The report was not updated due to your cancel command.

RAAC713E **Field must be "YES" or "NO"**

Explanation: The only acceptable values for this field are yes or no.

RAAC714E **Program name cannot be left blank**

Explanation: You must specify a program name for the report.

RAAC715E Language must be "1", "COBOL", "2", "COBOL-II", or "QMF"

Explanation: You can specify either COBOL, COBOL-II, or QMF (for a QMF report) as the language for the report. Choose the one desired for this registration. Since VS COBOL II is source compatible with AD/Cycle COBOL/370 and COBOL for MVS, you should specify COBOL-II if you are using either of those products.

RAAC716E Environment must be "B", "BATCH", "T", "TSO", "C", or "CICS"

Explanation: You can specify either batch, TSO or CICS as the environment for the report. Choose the one desired for this registration.

RAAC717E DB2 connection type must be "C", "CAF", "T", or "TSO"

Explanation: You can specify either CAF (the call attachment facility) or TSO (the TSO attachment facility) as the DB2 connection type for this report. Choose the one desired for this registration. This field is ignored for CICS programs, which always connect to DB2 via the CICS attachment facility.

RAAC718E Invalid LRECL value

Explanation: You must enter a positive integer.

RAAC719E Invalid character in report name

Explanation: Report names may not contain spaces.

RAAC720I Report not dropped; Cancel request honored

Explanation: The report was not dropped due to your cancel command.

RAAC721E Unrecognized line command

Explanation: Legal line commands when editing host variables are D (delete), I (insert), and R (repeat). Each may be followed by a

number specifying a repetition factor.

RAAC722E Variable name cannot be left blank

Explanation: You must specify a name for each of the report's variables.

RAAC723E Variable type cannot be left blank

Explanation: You must specify a data type for each of the report's variables.

RAAC724I Report created

Explanation: The specified report was created in the database.

RAAC725I Report dropped

Explanation: The specified report was dropped from the database.

RAAC726I Report updated

Explanation: The specified report was updated in the database.

RAAC727E Presentation must be "P" (print) or "N" (neither) with batch program

Explanation: Batch programs must either print a report or present no report.

RAAC728E Presentation must be "P", "D", or "N" with TSO program

Explanation: TSO programs must either print a report, display a report, or do neither.

RAAC729E Presentation must be "P", "D", or "N" with CICS program

Explanation: CICS programs must either print a report or display a report.

RAAC730E   Program * is online print program

Explanation: The program specified is an online print program and therefore cannot be invoked directly from a proc program.

RAAC731E   SQL type must be "S" (static) or "D" (dynamic)

Explanation: You can generate programs that use either static or dynamic SQL. Select the type desired for this generation.

RAAC732E   Invalid transaction identifier

Explanation: A CICS transaction identifier must be no more than four characters long.

RAAC733E   Field must be left blank when language is "QMF"

Explanation: You cannot enter a value in this field when registering a QMF report.

RAAC734E   Environment must be "TSO" when language is "QMF"

Explanation: You must set environment to TSO when registering a QMF report. The End User Facility does not support QMF reports in CICS or in batch.

RAAC735E   Invalid variable name

Explanation: The variable name that you entered for the report is invalid. Variable names cannot contain the colon (:) or ampersand (&) characters.

RAAC736E   EXEC library must be a PDS

Explanation: You must enter the name of a partitioned data set for the EXEC library.

RAAC737E   Program/plan name cannot be left blank

Explanation: You must specify a name for this program/plan.

RAAC738E   Program/plan name has invalid syntax

Explanation: The name you specified cannot be used as a program/plan name.

RAAC739I   Processing report list row *

Explanation: Program Generator is now processing the report list row identified in the message text.

RAAC740I   Specify batch job information for *

Explanation: You must specify job cards and other JCL information to generate JCL to either compile or run a program.

RAAC741I   Extended options not saved; Cancel request honored

Explanation: Any changes that you made to the extended options have been discarded.

RAAC742I   Extended options saved

Explanation: Any changes that you made to the extended options will be saved in your ISPF profile and used for the current generation.

RAAC743E   CAF module usage must be "H" (HPO CAF) or "D" (DB2 CAF)

Explanation: Enter H to generate a program which uses the HPO call attachment module (AACAF), or D to generate a program which uses the DB2 call attachment module (DSNALI). You should enter H if this program will be run as part of a procedure under DB2 Version 2 Release 2.

RAAC744E   Report width must be between 22 and 999, inclusive

Explanation: Enter the page width (from 22 to 999) to use when generating the report.

RAAC745E   **Report length must be "CONT" or between 1 and 999, inclusive**

Explanation: Enter the page length (from 1 to 999, or CONT) to use when generating the report. Entering CONT specifies that the report should be generated without any page breaks.

RAAC746E   **LRECL must be a positive integer**

Explanation: You must enter a positive integer.

RAAC747E   **Registration of QMF reports only supported with QMF 3.1 and higher**

Explanation: You can only register a report that runs a QMF query or procedure if you are running QMF Version 3 Release 1 or higher. You can only register a report that runs a QMF query or procedure if you are running QMF Version 3 Release 1 or higher.

RAAG messages

Messages that begin with RAAG are issued from The HPO/Governor Module. These messages appear on the message line on QMF panels and may also appear in the user's DSQDEBUG data set or RAADEBUG data set.

RAAG000I   **HPO prompt dialog begin (ID=*)**

Explanation: This message marks the beginning of a dialog with The HPO/Governor Module.

RAAG001E   **Error issuing asynchronous timer**

Explanation: A system error occurred while issuing the asynchronous timer. This is usually an unrecoverable error.

RAAG002E   *** rows have been fetched; Authorized limit exceeded**

Explanation: This message will appear if a resource violation is related to excess row fetches. Your current QMF command will be canceled and this message will appear on the message line. This message may optionally be logged to your DSQDEBUG data set and your RAADEBUG data set. If your site has enabled The HPO/Governor Module Help Panel, you can get more information by entering the HELP command.

RAAG003E   **CPU time exceeds authorized limit**

Explanation: This message will appear if a resource violation is related to excess CPU time consumption. Your current QMF command will be canceled and this message will appear on the

message line. This message may optionally be logged to your DSQDEBUG data set and your RAADEBUG data set. If your site has enabled The HPO/Governor Module Help Panel, you can get more information by entering the HELP command.

RAAG004E   **Not authorized to begin QMF session at this time**

Explanation: Your ID is not authorized to invoke QMF at this time. This message will not appear on any QMF panel but will be logged to your DSQDEBUG data set and your RAADEBUG data set.

RAAG005E   **Not authorized to process this SQL verb: ***

Explanation: Your ID is not authorized to process SQL statements containing the specified verb. Your QMF administrator can selectively enable or disable certain SQL verbs for your session. This message may optionally be logged to your DSQDEBUG data set and your RAADEBUG data set. If your site has enabled The HPO/Governor Module Help Panel, you can get more information by entering the HELP command.

RAAG006E Not authorized to process this QMF command:

Explanation: Your ID is not authorized to process QMF commands containing the specified verb. Your QMF administrator can selectively enable or disable certain QMF commands for your session. This message may optionally be logged to your DSQDEBUG data set and your RAADEBUG data set. If your site has enabled The HPO/Governor Module Help Panel, you can get more information by entering the HELP command.

RAAG007I This QMF command has already run for * CPU seconds

Explanation: This message will appear during a prompt dialog if the resource violation is related to excess CPU time consumption. It tells you the amount of CPU time that has already been consumed by your current QMF command.

RAAG008I This QMF command has already fetched * rows

Explanation: This message will appear during the prompt dialog if the resource violation is related to excess row fetches. It tells you the number of rows that have already been fetched by your current QMF command.

RAAG009I Valid prompt dialog responses are:

Explanation:
1. Press ENTER to continue processing
2. Type CANCEL and press ENTER to cancel command
3. Type NOPROMPT and press ENTER to continue without prompts

RAAG010I Enter your response now ===>

Explanation: You must select one of the listed responses during the prompt dialog. If you determine that the current command should not be allowed to run to completion and should now be canceled, enter CANCEL. If you determine

that the command should be allowed to continue processing, simply press Enter. If you want the command to run to completion without any more prompts, enter NOPROMPT. Any other response will cause this message to be redisplayed.

RAAG011I Response accepted; Processing will continue

Explanation: QMF will continue to process the command.

RAAG012I Response accepted; Will try to cancel command

Explanation: QMF will attempt to cancel your command. QMF cannot always successfully cancel a command.

RAAG013E Your response * is not valid

Explanation: This message indicates that the response you entered previously is invalid. Refer to the description of message RAAG009I for more information.

RAAG014I Response accepted; Continuing without prompts

Explanation: QMF will continue processing your command without further interruptions from the prompt dialog.

RAAG015E Query canceled by Query Analyzer

Explanation: Query Analyzer has canceled your query. This can happen at your request or as determined by your administrator. This message may optionally be logged to your DSQDEBUG data set and your RAADEBUG data set. If your site has enabled The HPO/Governor Module Help Panel, you can get more information by entering the HELP command.

RAAG017E QMF command canceled

Explanation: Your QMF command canceled due to an unknown resource violation. This message

may optionally be logged to your DSQDEBUG data set and your RAADEBUG data set. If your site has enabled The HPO/Governor Module Help Panel, you can get more information by entering the HELP command.

RAAG018E   Not authorized to use QMF at this time; Please end session

Explanation: Your ID is not authorized to continue using QMF at this time. You should end your session immediately. No further commands will be processed successfully.

RAAG019E   Query canceled by Monitor

Explanation: Your query has been canceled by a command from the Monitor online facility.

RAAG020E   Error issuing asynchronous timer

Explanation: A system error occurred while issuing the asynchronous timer.

RAAG021E   Error issuing prompt dialog

Explanation: A system error occurred while issuing the prompt dialog.

RAAG025I   * rows fetched; No more fetches allowed

RAAG025I   * rows fetched; No more fetches allowed without confirmation

Explanation: The HPO/Governor Module has detected that your command has fetched more rows than your authorized limit. You are able to view all of the rows that have already been fetched, but no more fetches will be allowed for this query. If the message text includes "without confirmation", then additional fetches will be allowed, but only after prompting you for confirmation.

RAAG026I   No limits found for resource group *

Explanation: The RLIMITS command was issued, however there is no current resource group schedule defined for the current date, day, and time in the specified resource group.

RAAG027I   The maximum allowable CPU limit is *

Explanation: As part of the governor prompt, this message indicates the current CPU limit in effect for the QMF session.

RAAG028I   The maximum allowable row limit is *

Explanation: As part of the governor prompt, this message indicates the current row limit in effect for the QMF session.

RAAG029I   Current resource limits shown

Explanation: The RLIMITS command has been successfully executed.

RAAG030I   * rows fetched; Query Analyzer row limit exceeded

Explanation: The row limit that you specified on the query analysis panel for this query has been exceeded. No more rows will be fetched.

RAAG998I   QMF HPO activity log disabled for user *, reason *, subsystem *

Explanation: This message will appear in the system log and indicates that a severe error was encountered while attempting to allocate, open, or write to one of the HPO Activity Log data sets. Check the reason code, DB2 subsystem ID, and see "Appendix G. HPO Activity Log failure reason codes" on page 327.

RAAG999I   HPO prompt dialog end

Explanation: This message signals the end of a dialog with The HPO/Governor Module. Press Enter to return to your QMF session.

RAAM messages

Messages that begin with RAAM are issued from the Monitor online facility and appear on the message line on ISPF panels.

RAAM001E   Please select one of the options listed below

Explanation: Choose one of the selection options listed on this panel.

RAAM002E   DB2 subsystem ID cannot be left blank

Explanation: You must enter a valid DB2 subsystem ID. Monitor will display activity from QMF sessions running under this subsystem.

RAAM003E   DB2 subsystem * not configured

Explanation: You (or your administrator) must run the HPO Configuration Dialog for the specified DB2 subsystem.

RAAM004I   Default values not saved; Cancel request honored

Explanation: Any changes that you made to the default parameter settings have been discarded.

RAAM005I   Default values will be saved

Explanation: Any changes that you made to the default parameter settings will be saved in your ISPF profile.

RAAM007E   Value must be between 00 and 24, inclusive

Explanation: This value indicates the number of preceding hours for which to display QMF activity. It is only used if you have specified (via the values of the preceding fields) that activity is to be shown relative to the current date and time.

RAAM008E   Specified command not defined

Explanation: The command that you entered on the command line is not valid.

RAAM009E   Specified command requires an argument

Explanation: The command that you entered on the command line requires an argument. Retry the command with proper arguments.

RAAM010E   Specified entry not found

Explanation: The entry specified in the command could not be found in the selection list. Verify that the argument is valid and try again.

RAAM011I   No entries were selected

Explanation: No entries were selected when you pressed Enter without specifying a command on the command line. The QMF session activity data you are viewing cannot be updated.

RAAM012E   Invalid selection code; Use "B"

Explanation: You entered an invalid selection code; use only B for browse.

RAAM013E   Invalid date specified; Use YYYYMMDD format

Explanation: The format of the date that you entered is incorrect. Specify a date in the format required (for example, 19940101), or enter TODAY (for the current date).

RAAM014I **Cancel request accepted for this QMF action**

Explanation: Your cancel request was accepted and passed on to The HPO/Governor Module. The command may or may not be canceled, depending on the current activity within QMF. Only QMF activity involving DB2 fetches may be successfully canceled from here.

RAAM015I **No SQL text available for this entry**

Explanation: You requested to browse SQL text, but no SQL text is available for this entry. The SQL column must contain a value of Y for this entry to be eligible for SQL text browsing.

RAAM016E **Cannot cancel action; Session already terminated**

Explanation: You cannot cancel QMF activity if the QMF session has already terminated.

RAAM017E **Invalid selection code; Use "B" or "C"**

Explanation: You entered an invalid selection code. Use only B for browse or C for cancel.

RAAM018I **Monitor data refreshed**

Explanation: You pressed Enter without specifying a command on the command line. The QMF session activity data that you are viewing has been updated.

RAAM019E **Invalid time specified; Use HHMMSS format**

Explanation: The format of the time that you entered is incorrect. Specify a time in the format required (for example, 123000), or enter TODAY (for the current time).

RAAM020E **VSAM OPEN error; Return code=*, reason code=***

RAAM021E **VSAM GET error; Return code=*, reason code=***

RAAM022E **VSAM PUT error; Return code=*, reason code=***

Explanation: An error occurred while attempting to open, read from, or write to the Monitor VSAM file.

RAAM023E **Dynamic allocation error; Return code=*, reason code=***

Explanation: An error occurred while attempting to allocate the Monitor VSAM file. A common cause of this error is attempting to invoke the Monitor online facility while you have a QMF session active. In this case, the HPO/Governor Module already has the Monitor VSAM file allocated. This may be the case if the return code is 4 and the reason code is 410.

RAAM024E **VSAM file name for Monitor not configured**

Explanation: No name was specified for the Monitor VSAM file in the HPO configuration module for this DB2 subsystem. As a result, the Monitor online facility is inactive. To enable these facilities, you (or your administrator) must reconfigure this subsystem and specify a name for this VSAM file.

RAAM025E **No QMF activity found for user ID(s) specified**

Explanation: There are no records available for display based on your selection criteria from the Set Default Parameters panel.

RAAM026E **No SQL text available for this entry**

Explanation: You requested to browse SQL text, but no SQL text is available for this entry.

RAAM027E   Unable to cancel session; May have previously terminated

Explanation: The current QMF activity could not be canceled. The session may have already ended. Refresh the activity panel (by pressing Enter) to determine the current state of the session.

RAAM028E   Severe error; No user detail found

Explanation: A severe error was detected when attempting to display QMF user session detail activity.

RAAM029E   Unable to lock the Monitor VSAM file; Try again

Explanation: The Monitor VSAM file could not be locked for exclusive access, most likely because another user was writing to it. Repeat your action.

RAAM031E   Parameter value must be "1" or "2" or "3" or "4"

Explanation: To reinitialize the entire Monitor VSAM File, set this parameter to 1. To delete all records except for today's, set this parameter to 2. To delete all records except for the last 7 days', set this parameter to 3. To delete all records except for the last 30 days', set this parameter to 4.

RAAM032E   Not all job cards can be left blank

Explanation: You must fill in at least one of these fields for the job card. If only one line is required for the job card, use the first line.

RAAM033E   Flag must be "E" (edit) or "S" (submit)

Explanation: To edit the JCL after it is generated, set this flag to E. To submit the JCL automatically after it is generated, set this flag to S. To bypass JCL generation and job submission, enter the END or CANCEL commands.

RAAM034E   Error allocating skeleton data set

Explanation: An error occurred while trying to allocate QMFHPO.SRAASKEL to your session.

RAAM035E   Error allocating temporary JCL file

Explanation: The generated JCL will reside in a temporary data set that is created automatically. An error occurred while creating the data set. Associated error messages may be written to the terminal.

RAAM036E   Error invoking ISPF edit session

Explanation: An error occurred while editing the generated JCL. Check with your system administrator and make sure that you are authorized to create and allocate temporary data sets.

RAAM037E   Not authorized to select this option

Explanation: Only system administrators are allowed to select this option

RAAM038E   Error opening plan * (RC=*, REASON=*)

Explanation: Either of these messages may appear while connecting to the specified DB2 subsystem. Check the return code (RC) and reason code (REASON) in *DB2 Messages and Codes*. Also check that the DB2 subsystem ID that you entered is correct.

RAAM998I   *

Explanation: This message will appear in the system log and indicates that a severe error was encountered while attempting to allocate, open, or write to the Monitor VSAM file. The message text will contain more specific information about the error.

RAAP messages

Messages that begin with RAAP are issued from the Manager online facility and appear on the message line on ISPF panels.

RAAP000I   Some required QMF files are not allocated; Trying to continue...

Explanation: Certain QMF data sets are required to be allocated to your TSO session to run QMF. This message indicates that some of the required data sets are not allocated to your session. Although QMF may operate successfully, some functions require these data set allocations. See *Installing QMF on MVS* to determine the required data set allocations for QMF.

RAAP001E   Select one of the valid actions listed below

Explanation: Review the list of supported actions at the bottom of this panel and select the desired action. If you leave this field blank, the LIST (L) action will be selected for you. If you want to exit this panel, enter the END command.

RAAP002E   Value must be "Q" (DSQDEBUG), "R" (RAADEBUG), "B" (Both), "N" (None)

Explanation: To log QMF debug messages, specify the letter above to direct the output to the appropriate files. Q will write to the standard QMF DSQDEBUG file, R will write to the RAADEBUG file, B will write to both of these files, and N disables QMF debug message logging.

RAAP003E   Resource group cannot be left blank

Explanation: You must enter the name of a resource group to perform the desired action. You can use % or _ as wildcard characters in the name if you wish to obtain a list of available resource groups. For example, to list all resource groups that start with the letter R, enter R% in this field.

RAAP004E   Resource group not found in database

Explanation: The resource group specified does not exist in the database. Check for incorrect entry. Also, this resource group may have been dropped or may not contain any HPO resource options.

RAAP005E   Wildcard characters are not allowed with specified action

Explanation: This action does not support multiple entries. You must specify a unique entry without any wildcard characters (% or _).

RAAP006I   Archive was not performed; Cancel request honored

Explanation: The error log entry was not archived due to your cancel command.

RAAP007I   Archive was performed successfully

Explanation: The error log entry was removed from the database and written to the error log archive data set.

RAAP008I   Delete was not performed; Cancel request honored

Explanation: The selected item was not deleted due to your cancel command.

RAAP009I   Delete was performed successfully

Explanation: The selected item was successfully removed from the database.

RAAP010E   Select one and only one row for processing

Explanation: You can only assign one resource group to this user profile.

RAAP011E   Select one of the valid actions listed on the panel

Explanation: Review the list of supported actions at the top of this panel and select the desired action. If you want to exit this panel, enter the END command.

RAAP012E   Duplicate user profile rows found

Explanation: The QMF user profile table should contain unique rows. Check with your administrator to have the extra rows deleted.

RAAP013E   Action must be either "A" (assign) or "U" (unassign)

Explanation: While processing assignments from this panel, you can either assign this resource group to a user profile or unassign this resource group from a user profile. Note that you cannot assign this resource group to a user profile that is already assigned to this resource group. You also cannot unassign a resource group from a user profile unless it is already assigned to this resource group.

RAAP014E   Selection filter must be either "1" or "2"

Explanation: The selection filter is used to determine what profiles will be displayed on the next panel. A value of 1 will display all user profiles, including those that are and those that are not assigned to this resource group. A value of 2 will display only those user profiles that are already assigned to this resource group.

RAAP015I   Resource group common controls have been saved in the database

Explanation: The resource group, including the description and common options that you just entered, has been saved in the database.

RAAP016E   SQL error was detected

Explanation: An SQL error occurred while processing your action. More specific information is displayed as the error occurs.

RAAP017I   Schedule * controls have been saved in the database

Explanation: The resource group scheduled controls, including all limit values and options that you just entered, have been saved in the database.

RAAP018E   Environment must be a valid QMF environment value or "-" (NULL)

Explanation: Enter a valid value for environment. Enter a dash (-) to specify NULL. If you are building a selection list, use % to specify all environments.

RAAP019E   Object(s) not dropped

Explanation: An error occurred while dropping the objects that you selected. The objects were not dropped.

RAAP020E   No qualifying error log entries found in database

Explanation: No entries were found in the Q.ERROR_LOG table that matched your selection criteria. Check that you specified the correct date, time, and user.

RAAP021E   No qualifying user profile found in database

Explanation: No entries were found in the Q.PROFILES table that matched your selection criteria. Check that you entered the correct creator, translation, and environment.

RAAP022E   Translation must be a valid QMF translation value or "*"

Explanation: Enter a valid QMF translation value. Valid values are ENGLISH, UPPERCASE,

FRANCAIS CANADIEN, SIMPLIFIED CHINESE,
T-CHINESE, DANSK, FRANCAIS, DEUTSCH,
ITALIANO, NIHONGO, HANGEUL,
PORTUGUES, ESPANOL, SVENSKA, FRANCAIS
(SUISSE), and DEUTSCH (SCHWEIZ). If you
enter *, the configuration default translation will
be used.

RAAP023E **Set asc/desc option to either "A" or**
"D"

Explanation: You can list the error log entries in
ascending or descending order. If you want to
list the oldest error log entries first, enter a value
of A for ascending (94/01/01 will display before
94/12/31). If you want to list the newest error log
entries first, enter a value of D for descending
(94/12/31 will display before 94/01/01).

RAAP024E **Characters per line must be**
between 22 and 999 inclusive

Explanation: The page width (the number of
characters per line) that you specify must be
within the QMF supported limits, which are 22
to 999, inclusive

RAAP025E **Lines per page must be between 1**
and 999 inclusive

Explanation: The page length (the number of
lines per page) that you specify must be within
the QMF supported limits, which are 1 to 999,
inclusive.

RAAP026E **Please select one and only one**
"CASE" option

RAAP027E **Please select one and only one**
"DECIMAL" option

RAAP028E **Please select one and only one**
"LANGUAGE" option

RAAP029E **Please select one and only one**
"TRACE" option

RAAP030E **Please select either YES or NO for**
"CONFIRM" option

RAAP031E **Please select either REL or ER for**
"MODEL" option

Explanation: Select one and only one of the
listed values.

RAAP032E **User profile already exists; Cannot**
create a duplicate

Explanation: You cannot create a user profile
with the specified creator, translation, and
environment. If you want to change the
attributes of an existing user profile, use the edit
option.

RAAP033I **Action was terminated; Cancel**
request honored

Explanation: No action was processed due to
your cancel command.

RAAP034I *** objects dropped; * objects not**
dropped

Explanation: Some of the objects that you
selected were dropped; others were not, due to
errors. Build a new selection list to determine
which objects have not been dropped.

RAAP035E **DB2 subsystem * not configured**

Explanation: You (or your administrator) must
run the HPO Configuration Dialog for the
specified DB2 subsystem.

RAAP036E **No entries archived due to error**

Explanation: The selected entries were not
archived due to errors.

RAAP037E **No entries deleted due to error**

Explanation: The selected entries were not
deleted due to errors.

RAAP038E   **Resource group already exists; Cannot create a duplicate**

Explanation: You cannot create a resource with the specified name. If you want to make changes to an existing resource group, use the edit option.

RAAP039E   *** entries archived; * entries not archived**

Explanation: Some of the error log entries were archived; others were not, due to errors. Build a new selection list to determine which entries still exist.

RAAP040E   *** entries deleted; * entries not deleted**

Explanation: Some of the error log entries were deleted; others were not, due to errors. Build a new selection list to determine which entries still exist.

RAAP041E   **Cannot unassign a profile that is not assigned to this resource grp**

Explanation: You can only unassign a user profile if it is already assigned to this resource group.

RAAP042E   **Cannot assign a profile that is already assigned**

Explanation: This assignment already exists. To reassign a profile, first unassign it, then assign it.

RAAP043E   **Creator cannot be left blank**

Explanation: This field cannot be left blank. You can use % and _ as wildcard characters in the creator for some actions, which are listed on the panel. For all other actions, you must specify the exact creator.

RAAP044I   **Resource group does not exist; This action will create it**

Explanation: You have selected to edit this resource group, however it does not contain any

HPO resource options. This edit action will allow you to create the resource group with HPO resource options.

RAAP045I   **User profile was not created; Cancel request honored**

Explanation: The user profile was not created due to your cancel command.

RAAP046E   **Wildcard characters are not allowed in this field**

Explanation: You can specify multiple entries in this field. You must specify a unique entry without any wildcard characters (% or _).

RAAP047I   **User profile was not modified; Cancel request honored**

Explanation: The user profile was not modified due to your cancel command.

RAAP048E   **Error allocating temporary JCL file**

Explanation: The generated JCL will reside in a temporary data set that is created automatically. An error occurred while creating the data set. Associated error messages may be written to the terminal.

RAAP049E   **Not authorized to access objects for this owner**

Explanation: You are not able to set your CURRENT SQLID to this ID. Any owner that you specify must be one of your valid SQLIDs.

RAAP050E   **User cannot be left blank**

Explanation: You must enter a value in the User field for this error log action.

RAAP051E   **Message number cannot be left blank**

Explanation: You must enter a value in the Message field for this error log action.

RAAP052E   Object(s) not found

Explanation: No object with this owner, name, and type exists in the database.

RAAP053I   Position the cursor on the desired row and select a valid action

Explanation: Review the list of supported actions at the top of this panel and select the desired action. If you want to exit this panel, enter the END command.

RAAP054E   Value must be positive integer

Explanation: You cannot enter alphabetic or special characters in this field. You must enter a positive integer.

RAAP055E   Value must be either "Y" (yes) or "N" (no)

Explanation: The only acceptable values for this field are yes or no.

RAAP056E   From Time cannot be left blank

Explanation: You must specify the From Time. To specify 8 a.m., enter 08:00. To specify noon, enter 12:00. To specify 3 p.m., enter 15:00. To specify midnight, enter 24:00.

RAAP057E   Timer interval must be between 0 and 6000 seconds

Explanation: The asynchronous timer will activate every "n" wall-clock seconds, where "n" is equal to the value that you enter in this field. The largest acceptable value is 6000 seconds (100 minutes).

RAAP058I   Schedule * does not exist; This action will create it

Explanation: You requested to edit this schedule, but it does not exist. This edit session will allow you to create the schedule.

RAAP059I   Schedule * not stored in database; Cancel request honored

Explanation: The schedule definition was not saved due to your cancel command.

RAAP060E   Table not found in database

Explanation: The table name that you entered cannot be found in the DB2 catalog. The DB2 subsystem ID specified may not be correct or you may have entered the table name or creator name incorrectly.

RAAP061I   Calculation for spill file completed

Explanation: The spill file allocation calculation is complete. The result is displayed on the panel.

RAAP062I   RUNSTATS has not been run on table; Space estimated for 1000 rows

Explanation: The spill file allocation is directly related to the number of rows in the specified table. Because the number of rows could not be obtained from the DB2 catalog, an estimate of 1000 rows was used.

RAAP063E   Device type not recognized

Explanation: Enter one of the following device types: 3350, 3380, or 3390.

RAAP064E   Owner cannot be left blank

Explanation: You must enter the owner of the objects to process. You can use % and _ as wildcard characters in the owner to select multiple objects if you are selecting the LIST action. For all other actions, you must specify the exact name.

RAAP065E   Name cannot be left blank

Explanation: You must enter the name of the objects to process. You can use % and _ as wildcard characters in the name to select multiple objects for some actions, which are

listed on the panel. For all other actions, you must specify the exact name.

RAAP066E   **Type can be "Q" (queries), "P" (procs), "F" (forms), or "%" (any)**

Explanation: You must enter one of the object types listed. If you leave this field blank, % will be assumed as a default.

RAAP067E   **Invalid parameter**

Explanation: An invalid parameter was passed to a Manager program.

RAAP068E   **"TO" object name cannot be left blank**

Explanation: You cannot leave the name of the "TO" object blank. You can either keep the same name as the "FROM" object or change the name.

RAAP069E   **Invalid object name; QMF reserved words cannot be used**

Explanation: You cannot use any of the following QMF reserved words as the name of a QMF object: CHART, DATA, FORM, FORM., PROC, PROFILE, QUERY, REPORT, and TABLE.

RAAP070I   **User profile has been successfully created**

Explanation: The user profile that you just entered has been added to the database.

RAAP071I   **User profile was successfully updated**

Explanation: The changes that you made to the user profile have been copied to the database.

RAAP072I   **Assignment request(s) have been processed**

Explanation: Your assignment requests have been processed and the database has been updated.

RAAP073I   **No assignments were requested**

Explanation: No assignments were processed because you did not select any of the rows on this panel.

RAAP074E   **Archive data set allocation error; Cannot continue**

Explanation: Make sure that the data set specified on the Error Log panel exists and is catalogued.

RAAP075E   **Archive data set must have DSORG = PS and LRECL = 131**

Explanation: The error log data set specified on the Error Log panel must conform to these DCB requirements.

RAAP076E   **Archive data set not specified; Action not allowed**

Explanation: You cannot request the ARCHIVE action unless you specify the name of a data set in which to archive the error log entries.

RAAP077E   **Archive data set does not exist or has been archived/migrated**

Explanation: Make sure that the data set specified on the Error Log panel exists and is catalogued.

RAAP078E   **Not able to browse unless object is SQL or prompted query or proc**

Explanation: Object Manager allows you to browse SQL and prompted queries and procedures. You cannot browse forms or any other types of queries.

RAAP079E   **"TO" object owner cannot be left blank**

Explanation: You cannot leave the "TO" object owner blank. You can either keep the same owner as the "FROM" object or you can change the owner.

RAAP080E   DB2 subsystem cannot be left blank

Explanation: You must set a valid DB2 subsystem ID before invoking this option.

RAAP081E   Resource group does not contain any HPO resource options

Explanation: To process this resource group, it must contain HPO resource options. This message indicates that only sample governor resource options exist for this resource group. You can edit this resource group to add the desired HPO resource options.

RAAP082E   Error allocating skeleton data set

Explanation: An error occurred while trying to allocate QMFHPO.SRAASKEL to your session.

RAAP083E   "TO" DB2 subsystem * not configured

Explanation: You (or your administrator) must run the HPO Configuration Dialog for the specified DB2 subsystem.

RAAP085E   Cannot migrate/copy objects to a previous release of QMF

Explanation: You cannot migrate/copy a QMF object to a previous release of QMF, due to downward incompatibilities. Migrating to a new release is fully supported because QMF versions are upward compatible. Migrating to the same release is also supported.

RAAP086I   Action was not performed; Cancel request honored

Explanation: The action you selected was not performed due to your cancel command.

RAAP087E   "TO" information cannot be the same as "FROM"

Explanation: When performing an action against an object, the "TO" information must be different than the "FROM" information.

RAAP088E   "TO" DB2 subsystem cannot be left blank

Explanation: You cannot leave the "TO" DB2 subsystem ID blank. You can either specify the same DB2 subsystem as the "FROM" subsystem, or you can change it. In either case, both the "FROM" and the "TO" DB2 subsystems must exist on the local MVS subsystem.

RAAP089E   From Date cannot be left blank

Explanation: This field cannot be left blank to browse an error log entry. Specify the date in the format requested on the panel.

RAAP090I   Object's status changed from * to *

Explanation: This object's restricted flag has been changed successfully.

RAAP091E   Error connecting to DB2 * (RC=*, REASON=*)

Explanation:

RAAP091E   Error opening plan * (RC=*, REASON=*)

Explanation: Either of these messages may appear while connecting to the specified DB2 subsystem. Check the return code (RC) and reason code (REASON) in *DB2 Messages and Codes*. Also check that the DB2 subsystem ID that you entered is correct.

RAAP092I   Detail does not exist for schedule *; Browse bypassed

Explanation: You have requested to browse the specified schedule. The schedule does not exist, so the browse request was bypassed.

RAAP093E   Start and stop dates must be valid dates of the form YYYYMMDD

Explanation: All dates are verified for correctness down to the number of days in a given month. For example, 19910229 is not a

valid date because 1991 was not a leap year.

RAAP094E   Schedule number must be between 0 and 255

Explanation: There can be up to 255 schedules per resource group. Zero is used to indicate that no further schedule processing is desired, but is not a valid schedule number.

RAAP095E   Start and stop times must be valid times of the form HHMM

Explanation: Time fields are verified for correctness. Times must be between 0000 and 2400.

RAAP096E   Not able to compile unless object is query or procedure

Explanation: You can invoke Compiler only with queries or procedures. Forms cannot be selected for this action

RAAP097E   .*ADHOCP is only valid for procs

Explanation: Ad hoc procs are tracked with a name of *ADHOCP. You must select an object type of P (for proc) when selecting an object name of *ADHOCP.

RAAP098E   History not found for this object

Explanation: No historical data was found for this object. Either the HPO Activity Log is disabled or the log data sets have not yet been summarized into the DB2 tables.

RAAP099E   Not able to rename more than one object at a time

Explanation: You can only rename objects one at a time.

RAAP100E   Data set name cannot be left blank

Explanation: You must specify the name of a data set that exists and is catalogued. JCL will be generated and written to this data set.

RAAP101E   Not all job card lines can be left blank

Explanation: You must fill in at least one of the fields for the job card. If only one line is required for the job card, use the first line.

RAAP102E   Flag must be "E" (edit) or "S" (submit)

Explanation: To edit the JCL after it is generated, set this flag to E. To submit the JCL automatically after it is generated, set this flag to S. To bypass JCL generation and job submission, enter the END command.

RAAP103E   Error occurred while invoking ISPF edit session

Explanation: An error occurred while editing the generated JCL. Check with your system administrator and make sure that you are authorized to create and allocate temporary data sets.

RAAP104E   Both TSO and CICS processing cannot be set to "N"

Explanation: You must specify that either TSO and/or CICS logs be processed. You cannot set both to N.

RAAP105I   No object activity information available

Explanation: No historical data was found for this object. Either the HPO Activity Log is disabled or the log data sets have not yet been summarized into the DB2 tables.

RAAP106E   HPO Activity Log records not written; File I/O error

Explanation: The actions performed in this session were not recorded into the HPO Activity Log data sets due to file I/O problems. All actions were accepted, however they will not appear in the log.

RAAP107E   Action not performed; Errors indicated in status log

Explanation: The action you selected was not performed due to errors. The errors are described on the displayed status log panel.

RAAP108I   Action performed successfully

Explanation: The action that you selected was completed without errors or warnings.

RAAP109E   Action performed with warnings as indicated in status log

Explanation: The specified action was completed, however warnings were detected. The status log panel lists all of the actions attempted and the result of each.

RAAP110E   Not authorized to select this option

Explanation: Only system administrators are allowed to select this option.

RAAP111E   Day values must be in range of 1-7, inclusive

Explanation: Values for the day of the week are given as numbers, where 1=Sunday, 2=Monday, 3=Tuesday, 4=Wednesday, 5=Thursday, 6=Friday, and 7=Saturday.

RAAP112I   Schedule * has been deleted from database

RAAP113E   Schedule * not deleted; May not exist in database

Explanation: The schedule specified was not deleted.

RAAP114E   No schedules found for resource group *

Explanation: No schedules exist for the specified resource group.

RAAP115E   Schedule number must be in range from 1 to 255

Explanation: Valid schedule numbers are between 1 and 255, inclusive.

RAAP116E   Value must be valid date in format specified

Explanation: You must specify a valid date in the form specified on the panel.

RAAP117E   Resource Group name must be supplied here

Explanation: Enter a valid resource group name or * for all resource groups. This field cannot be left blank.

RAAP118E   Invalid filtering criteria information

Explanation: You either specified From Time and not To Time or To Time and not From Time, or you entered an invalid value for Environment or Mode. Verify the values you entered in the Optional Filtering section.

RAAP119E   Object has not been compiled or registered

Explanation: No cross reference list is available because the object has not been compiled or registered with the End User Facility.

RAAP120E   From Date may not be greater than To Date

Explanation: You must enter a From Date that is earlier than the To Date. Dates must be entered in the format specified on the panel.

RAAP121E   From Time may not be greater than To Time

Explanation: You must enter a From Time that is earlier than the To Time. Times must be entered in the format specified on the panel.

RAAP122I   No query text available to browse for this run

Explanation: You requested to browse SQL text, but none is available for this entry. The SQL column must contain a value of Y for this entry to be eligible for SQL text browsing.

RAAP123E   Not able to analyze unless object is query

Explanation: You cannot analyze procedures or forms, only queries.

RAAP124E   Unrecognized command

Explanation: The command that you entered on the command line is not valid.

RAAP125I   Starting Query Analyzer; Please wait...

Explanation: The results of the analysis will be displayed when Query Analyzer is finished.

RAAP126E   Error allocating temporary data set; Cannot analyze

Explanation: An error occurred while allocating a temporary data set to use as input to Query Analyzer.

RAAP127I   Object remarks updated

Explanation: The remarks have been successfully modified for the object.

RAAP128E   Object remarks not updated

Explanation: The remarks were not updated due to a system error.

RAAP129E   Error connecting to location

Explanation: You cannot connect to the specified location from this DB2 subsystem.

RAAP130E   "TO" DB2 location must be left blank

Explanation: Because the "TO" DB2 subsystem is running DB2 Version 2 Release 2, the "TO" DB2 location must be left blank.

RAAP131E   Detail history available only for queries or procs

Explanation: You can only obtain detail history for queries and procs.

RAAP132E   Use *ADHOC only to view adhoc query history

Explanation: Ad hoc queries are tracked with a name of *ADHOC. You must select an object type of Q (for query) when selecting an object name of *ADHOC.

RAAP133E   Use *ADHOCP only to view adhoc proc history

Explanation: Ad hoc procs are tracked with a name of *ADHOCP. You must select an object type of P (for proc) when selecting an object name of *ADHOCP.

RAAP134E   Specified command not defined

Explanation: The entered command is not defined for this panel.

RAAP135E   Command needs argument

Explanation: Command requires at least one space following it and preceding an argument.

RAAP136E   Invalid argument for command

Explanation: Command argument is not valid.

RAAP137E   Only one argument allowed for command

Explanation: This command requires one and only one argument.

RAAP138E   Specified object name not found

Explanation: The object name could not be located as specified.

RAAP139E   Selection invalid; TSO Activity Log has not been configured

Explanation: The product has not been configured to track QMF TSO activity. Therefore, you cannot select the TSO Activity Log for processing.

RAAP140E   Selection invalid; CICS Activity Log has not been configured

Explanation: The product has not been configured to track QMF CICS activity. Therefore,

you cannot select the CICS Activity Log for processing.

RAAP141I   Additional list filters have been applied to detail records

Explanation: This message will appear when the list filters are carried through and applied to detail history records. This indicates that some detail records are not shown, due to the filter specifications on the Additional List Filter panel.

RAAP142E   Value must be a positive integer less than 32768

Explanation: The maximum allowable value for this field is 32768.

RAAQ messages

Messages that begin with RAAQ are issued from the Query Analyzer online facility and appear on the message line on ISPF panels and within a QMF session.

RAAQ000E   DB2 subsystem * not configured

Explanation: You (or your administrator) must run the HPO Configuration Dialog for the specified DB2 subsystem.

RAAQ001E   DB2 subsystem ID cannot be left blank

Explanation: You must enter a valid DB2 subsystem ID.

RAAQ002E   Please select one of the options listed below

Explanation: Choose one of the selection options listed on this panel.

RAAQ003E   Select one query source

Explanation: You may analyze a query that exists in a data set or you may enter ad hoc query text in the space provided. You cannot leave both of these areas blank.

RAAQ004E   Select only one query source

Explanation: You may analyze a query that exists in a data set or you may enter ad hoc query text in the space provided. Only one of these sources can be selected at a time.

RAAQ005E   Error allocating skeleton data set

Explanation: An error occurred while trying to allocate QMFHPO.SRAASKEL to your session.

RAAQ007E   Not all job cards can be left blank

Explanation: You must fill in at least one of these fields for the job card. If only one line is required for the job card, use the first line.

RAAQ008E   Flag must be "E" (edit) or "S" (submit)

Explanation: To edit the JCL after it is generated, set this flag to E. To submit the JCL automatically after it is generated, set this flag to S. To bypass JCL generation and job submission,

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enter the END command.

RAAQ009E   Error invoking ISPF edit session

Explanation: An error occurred while editing the generated JCL. Check with your system administrator and make sure that you are authorized to create and allocate temporary data sets.

RAAQ010E   Data set name cannot be left blank

Explanation: You must specify the name of a data set that exists and is catalogued. JCL will be generated and written to this data set.

RAAQ011E   Data set must have RECFM = PS or PO

Explanation: You must specify the name of a sequential data set or a partitioned data set.

RAAQ012E   Member name not allowed with sequential data sets

Explanation: You cannot specify a member name for the data set because it is a sequential data set.

RAAQ013E   Member name cannot be left blank for PDS

Explanation: If you specify a partitioned data set, you must also specify a member name.

RAAQ014E   Data set must have LRECL = 79 or 80

Explanation: The data set that you specify must have a record length of either 79 or 80. No other record length is supported.

RAAQ015E   Error processing input data set; Analysis not performed

Explanation: An unexpected error was encountered. Your query was not analyzed, but processing will continue.

RAAQ016I   Default values will be saved

Explanation: Any changes that you made to the default parameter settings will be saved in your ISPF profile.

RAAQ017E   Failure attempting to run REXX program *

Explanation: The named REXX program could not be found. Make sure that the library containing the EXEC is allocated to your session.

RAAQ020I   Default values not saved; Cancel request honored

Explanation: Any changes that were just made to the default parameter settings have been discarded due to your cancel command.

RAAQ021E   Member not found in PDS

Explanation: The member specified is not found in the data set. Check that you have entered the name correctly and that the member exists.

RAAQ022E   Database cannot be blank if tablespace is specified

Explanation: If you specify tablespace name, then you must also specify a database name. You can, however, specify a database without a tablespace.

RAAQ023E   Error allocating temporary JCL file

Explanation: The generated JCL will reside in a temporary data set that is created automatically. An error occurred while creating the data set. Associated error messages may be written to the terminal.

RAAQ026E   Data set does not exist or has been archived/migrated

Explanation: The specified data set could not be found. You must specify the name of a data set that exists and is catalogued.

RAAQ100E Call attachment failure on connect

RAAQ101E Call attachment failure on open

Explanation: An error occurred while Query Analyzer either was connecting to DB2 or opening its application plan. In either case, query analysis will be bypassed, and your session will continue normally.

RAAQ102E Call attachment failure on disconnect

Explanation: An error occurred while Query Analyzer was disconnecting from DB2. Query analysis was performed, and your session will continue normally.

RAAQ105E Configuration module not found; Cannot analyze query

Explanation: You (or your administrator) must run the HPO Configuration Dialog for the current DB2 subsystem. Query analysis will not be performed, but your session will continue normally.

RAAQ108E No database/tablespace name given for PLAN_TABLE creation

Explanation: A PLAN_TABLE does not exist and no database/tablespace for creating one is specified in the active resource group. As a result, a PLAN_TABLE cannot be created and query analysis will be bypassed.

RAAQ109E Query is not a SELECT statement

Explanation: Non-SELECT SQL is ignored by Query Analyzer.

RAAQ110E SQL error in EXPLAIN processing

Explanation: The query could not be processed by the EXPLAIN command. Either a PLAN_TABLE does not exist or there is an error in the query. Your session will continue normally.

RAAR messages

Messages that begin with RAAR are issued from the Compiler runtime routines. They appear in the SYSOUT DD for batch programs and on the message line for online TSO and CICS programs when running programs generated with the HPO/Runtime option.

RAAR000E Error loading runtime modules; REASON = *

Explanation: An attempt to dynamically load the runtime modules failed. Make sure that your JCL (if running in batch) or your TSO logon proc (if running online) allocates QMFHPO.SRAALOAD to STEPLIB.

RAAR001E Invalid function code *

Explanation: An invalid function code was passed to the runtime modules. Verify any changes that may have been made to the control variables and flow of the generated program.

RAAR002E Illegal call after end of data

Explanation: Once the runtime modules have indicated the end of the report, they do not expect to be called again. Verify any changes made to the control flow of the generated program.

RAAR003E Invalid language *

Explanation: Only OS/VS COBOL and VS COBOL II programs can call the runtime modules. Since VS COBOL II is source compatible with AD/Cycle COBOL/370 and COBOL for MVS, these products can also call the runtime modules.

RAAR004E   Form contains illegal variable reference

Explanation: The generated program's form contains a variable reference which is not allowed by QMF. See *QMF Reference* for allowed variable references.

RAAR005E   Report page longer than physical page

Explanation: The page length specified is not large enough to hold any report data after formatting the page header and footer. Either increase the page length or reduce the size of the page header or footer.

RAAR006E   Fixed area wider than physical page

Explanation: The fixed columns in this report exceed your page width. Either increase the page width or reduce the number of fixed columns.

RAAR007E   Error opening report DD *

Explanation: A REPORTnn DD could not be opened. Make sure that the appropriate report DDs are defined in your JCL. Up to 99 of these DDs may be required.

RAAR008E   Invalid data type * in form

Explanation: The generated program's form contains a column with an unrecognized data type. If you have modified the program, refer to the column in error and make sure that the value for its data type is one of the following: INTEGER (0), SMALLINT (1), DECIMAL (2), FLOAT (3), VARCHAR (4), DATE (5), TIME (6), TIMESTAMP (7).

RAAR009E   Report DD format error

Explanation: The runtime modules have encountered an error while writing a record to one of the report DDs. The report DDs must have RECFM = F.

RAAR010E   Error writing report DD

Explanation: The runtime modules have encountered an error while writing a record to one of the report DDs. Verify the definition of each report DD.

RAAR011E   Memory exhausted

Explanation: The program has exhausted available memory. If the report does not make use of any of the xPCT usage codes or the ACROSS usage code, increase the region size. If the report does make use of any of the above usage codes, modify the program to make use of a spill file (see "Spill File" on page 28).

RAAR012E   Error opening spill file

RAAR013E   Error writing spill file

RAAR014E   Error reading spill file

Explanation: An error occurred while processing the spill file. If your JCL does not define a RAASPILL DD, then add one (see "Batch Program requirements" on page 52).

RAAR015E   Could not get LRECL for report DD

Explanation: The runtime modules was unable to obtain the characteristics of the DD named REPORT01. This is most likely because the DD is not defined. Verify your JCL.

RAAR016E   Report DD record format must be fixed

Explanation: The REPORTnn DDs must have RECFM = F.

RAAR017E   Page width must be between 22 and 999

Explanation: The page width (which is the minimum of the value of the PAGE-WIDTH variable in the program and one less than the LRECL on the REPORTnn DDs) must be between

22 and 999. Verify the definition of the PAGE-WIDTH variable and your JCL.

RAAR018E   Queue buffer too small for report data

Explanation: A queue buffer (and its size) is passed to the runtime modules at initialization time. This is the buffer in which each row of an online report is returned to the program. This message indicates that the buffer is not wide enough to hold a row of the report.

RAAR019E   Error creating queue; RC = *

Explanation: An error occurred when creating the ISPF table which is used to store the online report.

RAAR020E   Error executing REXX EXEC RAARCXPR; RC=*, REASON=*

Explanation: An error was received from the REXX EXEC named RAARCXPR in QMFHPO.SRAAEXEC. This EXEC is executed to evaluate FORM.CALC expressions. Make sure that this library is allocated to the SYSEXEC DD and that the named EXEC exists in the library.

RAAR021E   Unexpected value returned by RAARCXPR

Explanation: This message should not be received unless modifications have been made to the RAARCXPR EXEC. Verify that no modifications have been made.

RAAR022E   *

Explanation: An expression passed to the RAARCXPR EXEC for evaluation contained a REXX error. The message text contains the REXX error message. This is not an error in the

invocation of the REXX EXEC, but rather a REXX error in a FORM.CALC expression.

RAAR023E   User edit error 99101: unrecognized edit code *

Explanation: The DSQUEDIT module containing user edit routines that was loaded does not implement the specified edit code. Check that the library containing the desired DSQUEDIT module is allocated to STEPLIB.

RAAR024E   User edit error 99102: improper input data type for edit code *

RAAR025E   User edit error 99103: invalid input value for item to be formatted

---

RAAR026E   User edit error 99104: item to be formatted too short

---

RAAR027E   User edit error 99105: not enough room for result in ECSRSLT

RAAR028E   User edit error * for edit code *

Explanation: The product use key found in the loaded RAAX module is invalid.

RAAR030E   Authorization failure; Cannot generate report

RAAR998E   Unknown error *

RAAR999E   Unexpected internal error *

Explanation: An unexpected error occurred.

RAAU messages

Messages that begin with RAAU are issued from the End User Facility and appear on the message line on ISPF panels or CICS maps.

RAAU001E   Severe error; Internal ISPF table could not be created

Explanation: An unexpected error was encountered.

RAAU002E   Error submitting job for report *

Explanation: An error occurred while submitting JCL to run the selected report. Additional information may be written to the terminal by TSO.

RAAU003E   Report list is empty

Explanation: There are no reports registered in the system for the specified report owner. If the specified owner is not one of your primary or secondary SQLIDs, a search is made only for shared reports with that owner.

RAAU004E   Report LRECL must be numeric

Explanation: The logical record length (LRECL) that you specify for the printed report must be numeric.

RAAU005E   Error during CAF (SSID=* PLAN=* RC=* REASON=*)

Explanation: An error occurred while attempting to connect to DB2. Check the return code (RC) and the reason code (REASON) in *DB2 Messages and Codes.*

RAAU006E   SQL error detected; SQLCODE = *

RAAU007E   SQL warning detected; SQLCODE = *

Explanation: An SQL error or warning occurred. Check the SQL code in *DB2 Messages and Codes.*

RAAU008E   Please select one of the options listed below

Explanation: Choose one of the selection options listed on this panel.

RAAU009E   DB2 subsystem ID cannot be left blank

Explanation: You must enter a valid DB2 subsystem ID.

RAAU010E   DB2 subsystem * not configured

Explanation: You (or your administrator) must run the HPO Configuration Dialog for the specified DB2 subsystem.

RAAU011I   Default values not saved; Cancel request honored

Explanation: Any changes that you made to the default parameter settings have been discarded.

RAAU012I   Default values will be saved

Explanation: Any changes that you made to the default parameter settings will be saved in your ISPF profile.

RAAU013E   Invalid selection code; Use "S" or "E"

Explanation: To select a report, use a selection code of S. Technical users can use a selection code of E to edit JCL to run the report.

RAAU014E   Selection code of "E" is not valid for online reports

Explanation: A selection code of E is only valid for batch reports. This action is only recommended for technical users who are familiar with JCL.

RAAU015E   No reports were selected

Explanation: To select a report, use a selection code of S. Technical users can use a selection code of E to edit JCL to run the report. You can select more than one report at a time.

RAAU016E   Error invoking ISPF edit session

Explanation: An error occurred while editing the generated JCL. Check with your system

administrator and make sure that you are authorized to create and allocate temporary data sets.

RAAU017I   **Report not processed; Cancel request honored**

Explanation: The report will not be processed due to your cancel command.

RAAU018E   **Please enter a numeric value for this input variable**

Explanation: You cannot specify alphabetic characters when entering numeric values. Check the variable data type and enter a valid number.

RAAU019E   **)IF out of sequence in skeleton at line ***

RAAU020E   **)ELSE out of sequence in skeleton at line ***

RAAU021E   **Unrecognized token in skeleton at line ***

Explanation: The skeleton JCL data set contains an invalid control code. Verify that the installation process was successful and complete.

RAAU022E   **Report copies must be a number between 1 and 254**

Explanation: If you specify a number of report copies, the value must be a positive integer that does not exceed 254.

RAAU023E   **Report owner must be valid SQLID**

Explanation: You must specify one of your primary or secondary SQLIDs as the report owner. That is, you must be authorized in DB2 to change your CURRENT SQLID to this report owner.

RAAU024E   **Specified command not defined**

Explanation: Valid commands are LOCATE, SELECT, and EDIT, and any abbreviations of these commands.

RAAU025E   **Specified command requires an argument**

Explanation: You must specify a report name as an argument to the command.

RAAU026E   **Specified report not found**

Explanation: The report that you have specified does not exist. Check the spelling of the report name.

RAAU027E   **Error allocating temporary JCL data set ***

Explanation: The JCL will be generated in a temporary data set that is created automatically. An error occurred while creating the data set. Associated error messages may be written to the terminal.

RAAU028E   **Error allocating skeleton data set ***

Explanation: An error occurred while trying to allocate QMFHPO.SRAASKEL to your session.

RAAU029E   **Value must be blank, "T" (TSOID), or "P" (PRIMEID)**

Explanation: Under QMF Version 3 or later, your profile can be keyed by either your TSO logon ID or by your primary DB2 authorization ID. Enter the desired value. This flag is ignored under QMF Version 2.

RAAU030I   **Starting QMF; Please wait...**

Explanation: A QMF session must be started to run this report. This message will be displayed until QMF is started.

RAAU031E   *

Explanation: Any error or warning messages returned by QMF are listed with this error.

RAAU032E   **Error starting QMF; QMF message *; Start parameter ***

Explanation: A QMF session must be started to run this report. The report cannot be run because this process failed. The QMF error message number and the start parameter in error are both indicated in the message. See *QMF Messages and Codes* for more information.

RAAU033I   **Job submitted for report ***

Explanation: The report you selected will be run in batch. This message indicates that the batch job has been submitted for processing.

RAAU034I   **Variable set * accepted; Ready for next set**

Explanation: Because you pressed Enter after the previous set of input variables were specified, you now have to make a decision whether to specify another set of input variables, run the report with all sets previously specified, or abort all report requests. Follow the instructions in the panel header for valid keys and commands.

RAAU035E   **Data set must exist, have DSORG = PS or PO, and have LRECL = 80**

RAAU036E   **Data set must exist before JCL can be generated**

Explanation: You must specify the name of a data set that has the listed DCB characteristics.

RAAU037E   **Member name cannot be specified without data set name**

Explanation: You cannot leave the data set name blank if you specify a member name.

RAAU038E   **Cannot specify member name in this field**

Explanation: You cannot specify the member name as part of the data set name. For example, PDS.LIBRARY(MEM) is invalid. Specify the member name in the Member field.

RAAU039E   **Member name cannot be specified for sequential data sets**

Explanation: You cannot specify a member name for a sequential data set.

RAAU040E   **Member name must be specified for partitioned data sets**

Explanation: If you specified a partitioned data set, you must specify a member name in the Member field.

RAAU041E   **Error connecting to location**

Explanation: You cannot connect to the specified location from this DB2 subsystem. Check with your system or database administrator.

RAAU100E   **Invalid scroll amount**

Explanation: The scroll amount that you entered is invalid. Valid values are MAX, HALF, PAGE, DATA, CSR, or an integer.

RAAU101E   **Invalid selection code; Use "S"**

Explanation: To select a report, use a selection code of S.

RAAU102E   **No reports found**

Explanation: No reports have been assigned to this transaction ID.

RAAU103E   **Queue overflow; Report list truncated**

Explanation: The maximum number of registered reports that can be displayed is 32767. More than 32767 registered reports were found,

but only the first 32767 will be displayed.

RAAU104E   Invalid argument to command

Explanation: The command that you entered
does not accept the type of argument that you
entered. For example, the LOCATE command
(when entering variable values) can only accept a
numeric argument.

**RAAU105E   Only one argument to command
is allowed**

Explanation: The command that you entered
accepts only one argument.

**RAAU106E   No host variables found in
registration database**

Explanation: The row for the selected report in
the Q.REPORTS table (the DB2 table holding the

report registration information) contains a value
of Y for the VARIABLES column.

However, the Q.REPORT_VARIABLES table does
not contain any rows for the report. You (or your
administrator) must resolve this inconsistency
before you can run the report.

**RAAU107E   Queue overflow; Host variable list
truncated'**

Explanation: The maximum number of
variables that can be used by a registered report
is 32767. More than 32767 variables were found
for this report, but only the first 32767 will be
displayed.

RAAX messages

Messages that begin with RAAX are primarily issued from the HPO
Configuration Dialog and common functions.

**RAAX000E   Please select one of the options
listed below**

Explanation: Choose one of the selection
options listed on this panel.

**RAAX001E   DB2 subsystem ID cannot be left
blank**

Explanation: You must enter a valid DB2
subsystem ID. This selects the subsystem to be
configured.

**RAAX002I   Configuration parameters not
saved; Cancel request honored**

Explanation: The configuration parameters were
not saved due to your cancel command. Previous
values remain in effect.

RAAX003E   Field cannot be left blank

Explanation: You must enter a value in this
field. There is no default value.

**RAAX005E   Invalid QMF version; Must be
"2.3", "2.4", "3.1.x", "3.2", "3.3", or
"6.1"**

Explanation: Enter one of these QMF versions
and releases: 2.3; 2.4; 3.1.0; 3.1.1; 3.2; 3.3; or 6.1. If
your QMF version and release is higher than 6.1
enter 6.1.

**RAAX006E   Translation must be a valid QMF
translation value**

Explanation: Enter the default value to use for
Translation for this QMF installation. Valid
values are ENGLISH, UPPERCASE, FRANCAIS
CANADIEN, SIMPLIFIED CHINESE,
T-CHINESE, DANSK, FRANCAIS, DEUTSCH,
ITALIANO, NIHONGO, HANGEUL,

PORTUGUES, ESPANOL, SVENSKA, FRANCAIS (SUISSE), and DEUTSCH (SCHWEIZ).

RAAX007E   Data set does not exist or has been archived/migrated

Explanation: The specified data set could not be found. You must specify the name of a data set that exists and is catalogued.

RAAX008E   Flag must be "Y" (yes) or "N" (no)

Explanation: The only acceptable values for this flag are yes or no.

RAAX009E   Invalid data set name prefix

Explanation: Enter the prefix of the names of the CICS libraries at your site. This field is validated by checking for the existence of either a CICS .LOADLIB library or a .SDFHLOAD library.

RAAX010I   Saving configuration parameters; Please wait...

Explanation: The configuration parameters are being saved in QMFHPO.SRAALOAD. Please wait while the library is updated.

RAAX011E   Error allocating temporary data set; RC = *

Explanation: Error allocating temporary data set; RC = *A severe error occurred while issuing a TSO command to save the configuration parameters. Additional information may be written to your terminal.

RAAX012E   Error writing data sets

Explanation: An error occurred writing a temporary data set used as input to the assembler.

RAAX013E   Assembler error writing configuration module; Use batch option

Explanation: To build the configuration module, an assembler program is created and assembled automatically. All errors encountered during the assemble process are considered severe. If an error occurs, you will browse the output from the assemble (which will contain more information about the error).

RAAX014E   Linkage editor error writing configuration module: Use batch option

Explanation: To build the configuration module, an assembler program is created, assembled, and link-edited automatically. If an error occurs, you will browse the output from the link-edit (which will contain more information about the error).

RAAX021I   Configuration parameters saved

Explanation: The configuration parameters have been saved.

RAAX022E   Cannot bind plans or packages until subsystem is configured

Explanation: The application plans and packages cannot be bound until the subsystem is configured (by selecting option 1 from the HPO Configuration Dialog Selection Menu).

RAAX023I   Binding plans; Please wait...

Explanation: The selected plans are being bound online. Please wait for this process to finish. Status information will be written to your terminal as the bind proceeds.

RAAX024I   Plans bound successfully

Explanation: The plans were successfully bound.

RAAX025E   Error binding plans

Explanation: An error occurred while binding the selected plans. More information should have been written to your terminal. If not, try binding the plans in batch.

RAAX026E   Member not allowed

Explanation: You must not specify a member in this field. The name of a partitioned data set (PDS) is expected. Enter a name without specifying a member.

RAAX027E   Invalid DCB info; Must be DSORG=PS, RECFM=FB, LRECL=80

Explanation: You must enter the name of a data set that has the DCB characteristics listed. Either specify the name of an existing data set with the proper characteristics, or enter the name of a nonexistent data set which you will subsequently be allowed to create online.

RAAX028E   Space units must be "T" (tracks) or "C" (cylinders)

Explanation: Enter the units for the following space allocations for the data set to be created.

RAAX029E   Invalid space quantity

Explanation: Enter a quantity (in the units specified in the previous field) for the primary or secondary space allocation for the data set.

RAAX030I   Data set(s) created

Explanation: The specified data sets have been created with the proper DCB information and the specified space allocations.

RAAX031E   Invalid DB2 version; Must be "2.2", "2.3", "3.1", "4.1", "5.1", or "6.1"

Explanation: Enter one of these four supported DB2 versions and releases. If your DB2 version and release is higher than 6.1, enter 6.1.

RAAX032E   Member must be specified

Explanation: You must enter a member name with a data set name in this field.

RAAX033E   Invalid data set; Must be VSAM

Explanation: The specified data set is invalid. You must enter the name of a VSAM file. The specified data set is invalid.

RAAX034E   Cannot specify SQL text log without activity log

Explanation: SQL text cannot be logged without logging activity. If you specify an SQL text log, you must also specify an activity log.

RAAX035E   Invalid DCB info; Must be DSORG=PS, RECFM=VB, LRECL=3600, BLKSIZE=3604

Explanation: You must enter the name of a data set that has the DCB characteristics listed. Either specify the name of an existing data set with the proper characteristics, or enter the name of a nonexistent data set which you will subsequently be allowed to create online.

RAAX036E   CPU time must be non-negative integer

Explanation: You must specify a number for the CPU time threshold value.

RAAX037I   Configuration does not exist; This action will create it

Explanation: No configuration information was found for the specified DB2 subsystem. Proceeding with the configuration process will create it. Configuration values from the last subsystem configured will be carried forward as default values.

RAAX038E   Unrecognized command

Explanation: The command that you entered on the command line is not valid.

RAAX039I   No plans were selected for bind

Explanation: You did not select any plans on the Bind Application Plans panel.

RAAX040E   Packages not supported prior to DB2 version 2.3

Explanation: You can only bind packages under DB2 Version 2 Release 3 or higher.

RAAX041I   No packages were selected for bind

Explanation: You did not select any packages on the Bind Packages panel.

RAAX042I   Binding packages; Please wait...

Explanation: The packages for the components that you selected are being bound online. Please wait for this process to finish. Status information will be written to your terminal as the bind proceeds

RAAX043I   Packages bound successfully

Explanation: The packages for the components you selected have been successfully bound.

RAAX044E   Error binding packages

Explanation: An error occurred while binding the packages for the selected components. More information should have been written to your terminal. If not, try binding the packages in batch.

RAAX045E   Not all job cards may be left blank

Explanation: You must fill in at least one of these fields for the job card. If only one line is required for the job card, use the first line.

RAAX046E   Member cannot be specified with temporary data set

Explanation: When you are using a temporary data set for generated JCL, you cannot specify a

member name. The temporary data set created will be a sequential data set.

RAAX047E   Invalid DCB info; Must be DSORG=PS or PO

Explanation: You must specify the name of a sequential data set or a partitioned data set.

RAAX048E   Member name has invalid syntax

Explanation: The member name that you entered does not conform to PDS member naming rules.

RAAX049E   Flag must be "E" (edit) or "S" (submit)

Explanation: To edit the JCL after it is generated, set this flag to E. To submit the JCL automatically after it is generated, set this flag to S. To bypass JCL generation and job submission, enter the END command.

RAAX050E   Could not open data set *

Explanation: The specified data set could not be opened. Verify that the data set exists, that you have permission to read it, etc.

RAAX051E   Error editing data set *

Explanation: The specified data set could not be edited. Verify that the data set exists, that you have permission to read it, etc.

RAAX052I   JCL submitted

Explanation: JCL to save configuration information, bind plans, or bind packages has been submitted.

RAAX053E   Error submitting JCL; RC = *

Explanation: An error occurred while submitting JCL. Additional information may be written to your terminal by TSO.

RAAX054E   Error writing data set *

Explanation: An error occurred while writing the specified data set. Verify that the data set is not full, that you have permission to write it, etc.

RAAX055E   Error reading data set *

Explanation: An error occurred reading the specified data set. Verify that the data set exists, that you have permission to read it, etc.

**RAAX056E   Invalid control statement at line *
                of ***

Explanation: The skeleton data set contains an invalid control code. Verify that the installation process was successful and complete.

RAAX057E   Too many)IF's at line * of *

Explanation: The nesting of)IF's in the skeleton data set is too great. The maximum nesting level is 10. Verify that the installation process was successful and complete.

RAAX058E   Unexpected)ELSEIF at line * of *

Explanation: An)ELSEIF was found in the skeleton data set without a preceding)IF. Verify that the installation process was successful and complete.

RAAX059E   Unexpected)ELSE at line * of *

Explanation: An)ELSE was found in the skeleton data set without a preceding)IF. Verify that the installation process was successful and complete.

RAAX060E   Unexpected)ENDIF at line * of *

Explanation: An)ENDIF was found in the skeleton data set without a preceding)IF. Verify that the installation process was successful and complete.

RAAX061E   Unexpected EOF in *

Explanation: The end of the skeleton data set was reached while processing was still within an)IF or)LOOP. Verify that the installation process was successful and complete.

RAAX062E   Loop too long at line * of *

RAAX063E   Illegal nested loop at line * of *

Explanation: The skeleton data set contains an invalid construct. Verify that the installation process was successful and complete.

**RAAX064E   Unexpected)ENDLOOP at line *
                of ***

Explanation: An)ENDLOOP was found in the skeleton data set without a preceding)LOOP. Verify that the installation process was successful and complete.

**RAAX065E   Unterminated)IF in loop at line *
                of ***

Explanation: An)ENDLOOP was found in the skeleton data set without an)ENDIF to terminate an)IF within the loop. Verify that the installation process was successful and complete.

**RAAX066I   Plans not bound; Cancel request
                honored**

Explanation: The selected plans were not bound due to your cancel request.

**RAAX067I   Packages not bound; Cancel
                request honored**

Explanation: The packages for the selected components were not bound due to your cancel request.

**RAAX068E   Invalid DCB info; Must be
                DSORG=PO, RECFM=F,
                LRECL=79**

RAAX069E   **Invalid DCB info; Must be DSORG=PO, RECFM=V, *<=LRECL<=7290**

RAAX070E   **Invalid DCB info; Must be DSORG=PO**

RAAX071E   **Invalid DCB info; Must be DSORG=PO, RECFM=F, LRECL=80**

RAAX072E   **Invalid DCB info; Must be DSORG=PO, RECFM=U**

Explanation: You must specify the name of a data set with the specified DCB characteristics.

RAAX073E   **Flag must be "F" (foreground) or "B" (batch)**

Explanation: You must specify either F to perform the selected action online at your terminal while you wait, or B to generate JCL to perform the selected action in batch.

RAAX074E   **Temporary data set not allowed in this field**

Explanation: You cannot specify a temporary data set (*TEMP) in this field.

RAAX075E   **Error allocating work data sets; Use batch mode for action**

Explanation: An unknown error occurred while allocating work data sets to perform the selected action online. Try selecting batch mode for the action.

RAAX076E   **Work data set DCB information overridden; Use batch mode for action**

Explanation: The system has overridden the DCB characteristics of a work data set needed to perform the selected action online. This is most likely the result of automatic selection of block

size for allocated data sets. Try selecting batch mode for the action.

RAAX077E   **Selected option is not installed**

Explanation: The option that you selected has not been installed

RAAX078E   **.Error issuing LMINIT on data set**

Explanation: A severe ISPF error occurred when issuing the LMINIT service.

RAAX079E   **Error issuing LMOPEN on data set**

Explanation: A severe ISPF error occurred when issuing the LMOPEN service.

RAAX080E   **Could not locate required load modules**

Explanation: Neither the RAACGUI or the RAARM module could be located in QMFHPO.SRAALOAD. This probably indicates an error unloading the distribution tape.

RAAX081I   **Some required QMF files are not allocated; Trying to continue...**

Explanation: Certain QMF data sets are required to be allocated to your TSO session to run QMF. This message indicates that some of the required data sets are not allocated to your session. Although QMF may operate successfully, some functions require these data set allocations. See *Installing QMF on MVS* to determine the required data set allocations for QMF.

RAAX082E   **RAAXPR/RAAXTB cannot be found; contact product adminstrator**

Explanation: Either RAAXPR or RAAXTB is missing from the capital SRAALOAD library.

RAAX083E Invalid registration or trial module; contact product administrator

Explanation: Either the registration or the trial module contains an invalid key.

Appendix A. Connection to QMF for exports

One of the powerful features of Program Generator is that it can **automatically** export QMF queries, forms, and procedures whether it is invoked from within a QMF session or from outside a QMF session. Program Generator uses the SAA[4] callable interface to establish an instance of QMF and to communicate with it.

Export data set attributes

QMF requires the following DCB for export data sets:

Data Set Type	LRECL	RECFM	Notes
QUERY	must be 79	F	
PROC	must be 79	F	
FORM	minimum 81	V	For QMF Version 2
	minimum 161	V	For QMF Version 3 or higher
	maximum 7290	V	

Exporting from within a QMF session

A unique feature of Program Generator is that you can invoke it from within a QMF session. This allows you to easily navigate between QMF and Program Generator without having to repeatedly exit and restart each. The primary functional benefit of using Program Generator under QMF is that the current QUERY, FORM, or PROC object can be used.

Build shared QMF procedure

To invoke Program Generator from a TSO/ISPF session, you can issue the following TSO command:

```
CALL 'QMFHPO.SRAALOAD(RAAMAIN)' 'CO'
```

To invoke Program Generator from under QMF, a shared procedure should be set up that executes this TSO command. As an example, here is a QMF procedure named QMFADM.RCO. It contains only one command:

```
TSO CALL 'QMFHPO.SRAALOAD(RAAMAIN)' 'CO'
```

---

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To run Program Generator from QMF, you simply run this QMFADM.RCO procedure from the QMF command line:

```
RUN PROC QMFADM.RCO
```

QMFHPO.SRAALOAD must be allocated to the TSO session when this procedure is run.

Build QMF command synonym

To make things easier, you can build a QMF command synonym to run this TSO command. In fact, a QMF command synonym named RCO is created during installation. Therefore, all you have to type on the QMF command line is:

```
RCO
```

Exporting from outside of QMF

The SAA callable interface of QMF (explained in detail in *Developing QMF Applications and Managing QMF for MVS*) has the ability to start an instance of QMF and execute QMF commands. Program Generator makes use of this SAA callable interface each time that you direct it to automatically export QMF objects.

QMF invokes a REXX program that initializes start-up parameters. A default REXX initialization program is shipped with QMF. This sample initialization program, named DSQSCMDE , resides in the QMF.DSQEXECE library. To run QMF, the DSQEXECE library must be allocated to the SYSEXEC DD in your TSO logon procedure (as directed in *Installing QMF on MVS*).

On the Set Default Parameters panel for Program Generator, there is a field named QMF/REXX Initialization Program. If you leave this field blank, DSQSCMDE will be used as the initialization program. If you want Program Generator to use a different REXX program, specify the name on this default panel.

The DB2 subsystem ID that is specified on the Program Generator Menu will override the DSQSSUBS parameter that is set in the REXX program.

Appendix B. Migrating from the QMF sample governor

If you are currently using either of the QMF sample governors (in TSO or CICS), you should keep your existing resource groups separate from any new groups that you create using the Governor online facility.

If The HPO/Governor Module detects a resource group with only sample resource options (SCOPE, ROWLIMIT, ROWPROMPT, and so on), it will govern the QMF session appropriately using those thresholds and limits. Otherwise, if it detects a resource group with both sample and HPO resource options (AACOM, AASCHD), the sample thresholds and limits will be ignored.

Because there is not a one-to-one relationship between sample and HPO resource options, there is no fail-safe, automated method of migration. However, you can quickly establish comprehensive and effective QMF resource controls using the Governor online facility.

Appendix C. Interface to the HPO call attachment module

The HPO call attachment module (AACAF) performs three functions:

- Attach to DB2
- Open a plan
- Disconnect from DB2

Parameter area structure (in OS/VS COBOL and VS COBOL II)

```
01  CAF-AREA.
    03  CAF-ACTION    PIC S9(9) COMP.
    03  CAF-SSID      PIC X(4).
    03  CAF-PLAN      PIC X(8).
    03  CAF-RETURN    PIC S9(9) COMP.
    03  CAF-REASON    PIC X(8).
```

Input values

Parameter	Description
CAF-ACTION	Valid input values are +0 (connect to DB2), +1 (open plan), and +2 (disconnect from DB2).
CAF-SSID	The DB2 subsystem ID to which to connect. This is required when the action code is +0 or +1.
CAF-PLAN	The name of the plan to open. This is required when the action code is +1.

Output values

Parameter	Description
CAF-RETURN	This is set to +0 if the function is completed successfully. Otherwise, it contains the CAF return code.
CAF-REASON	This is set to spaces if the function is completed successfully. Otherwise, it contains the CAF reason code.

Pseudocode for static call

```
move appropriate values into CAF-AREA.
CALL 'AACAF' USING CAF-AREA.
IF CAF-RETURN NOT = ZERO
```

THEN process error.

Appendix D. Program Generator specifications

This appendix describes specifications and restrictions for Program Generator.

QMF commands supported in procedures

The following QMF commands are supported when parsing a QMF linear procedure:

- DISPLAY REPORT
- ERASE TABLE
- IMPORT FORM
- IMPORT QUERY
- PRINT REPORT
- RUN QUERY
- SAVE DATA
- SET GLOBAL
- SET PROFILE

Edit codes supported in forms

All QMF edit codes are supported, with the following restrictions:

- The B, BW, X, and XW edit codes are supported only when generating HPO/Runtime programs.
- User-defined edit codes are not supported when generating CICS programs.
- Vxxxx edit codes with floating point values as input are not supported when generating standalone programs.
- The TDL and TTL date and time edit codes are not supported.

Usage codes supported in forms

All QMF usage codes are supported, with the following restrictions:

- The ACROSS and CALC usage codes are supported only when generating HPO/Runtime programs (which implies that they are not supported when generating CICS programs).
- The CSUM, PCT, CPCT, TPCT, and TCPCT usage codes are not supported when generating programs that also use the ACROSS usage code.

- The PCT, CPCT, TPCT, and TCPCT usage codes are not supported when generating CICS programs.

Aggregation variables in form text (e.g., &AVG1) are supported in the same way as the corresponding usage code.

Additional fields supported in forms

All QMF form panels and fields on those panels are supported, with the following restrictions:
- The **Select Panel Variation?** field on the FORM.DETAIL panel and the entire FORM.CONDITIONS panel are not supported. An error will occur at generation time if they are specified.
- Specification of column definitions on the FORM.COLUMNS panel is not supported. An error will occur at generation time if they are specified.
- Specifying BOTTOM for the **Blank Lines Before Text** field on the FORM.FINAL panel is silently treated as if 0 was specified.
- The **Line wrapping width?** field on the FORM.OPTIONS panel is not supported and is silently ignored if it is specified.
- The **Column wrapped lines kept on a page?** field on the FORM.OPTIONS panel is not supported in HPO/Runtime programs and is silently ignored if it is specified. This field is supported in standalone programs.

Additional restrictions and limitations
- The maximum number of reports per procedure is 100.
- The maximum number of substitution variables per report is 50.
- &DATE and &TIME variables in form text are always formatted according to the ISO date and time formats, regardless of the installation default.
- Global substitution variables used in form text can only be replaced with host variables when generating standalone programs.

Restrictions on and dependencies between the different program generation options are described in "Setting generation options" on page 29, "Setting extended generation options" on page 32, and "Setting proc program generation options" on page 35.

Appendix E. HPO Activity Log data set specifications

This appendix describes the format of the HPO Activity Log data sets and the values that can appear in each field of each record.

HPO Activity Log record types

There are several record types written to the HPO Activity Log data sets. The first byte in each record identifies the type of record.

Record Type	Description
X'00'	Start QMF session
X'01'	ERASE command
X'02'	PRINT command
X'03'	DISPLAY command
X'04'	RUN command
X'05'	EXPORT command
X'06'	IMPORT command
X'07'	SAVE command
X'08'	Incremental database activity
X'09'	CONVERT command
X'1F'	End QMF session

Layout for type X'00' and X'1F' records

Offset	Byte Numbers	Description
0	1	Record type
1	2-51	Reserved for future use
51	52-55	Date in packed signed Julian format (1/31/1996 is stored as X'0096031F')
55	56-59	Time in packed unsigned format (12:10:46:50 is stored as X'12104650')
59	60	Reserved for future use
60	61-68	TSOID
68	69	'2' or '3' TSO session; '5' CICS session, 'O' Object Manager

69	70-73	DB2 Subsystem ID
73	74	'1' online session; '2' batch session
74	75-76	Reserved for use by the HPO Activity Log batch job
76	77-80	Reserved for future use

Layout for type X'01' through X'07' and X'09' records

Offset	Byte Numbers	Description
0	1	Record type
1	2-17	Object location
17	18-25	Object owner
25	26-43	Object name
43	44-51	Current SQLID
51	52-55	Date in packed signed Julian format (1/31/1996 is stored as X'0096031F')
55	56-59	Time in packed unsigned format (12:10:46:50 is stored as X'12104650')
59	60	Success indicator, one of The HPO/Governor Module Cancel Codes
60	61-68	TSOID
68	69	'2' or '3' TSO session; '5' CICS session, 'O' Object Manager
69	70-73	DB2 Subsystem ID
73	74	'1' online session; '2' batch session
74	75-76	Reserved for use by the HPO Activity Log batch job
76	77-80	Reserved for future use

Layout for type X'08' records

Offset	Byte Numbers	Description
0	1	Record type
1	2-3	Reserved for future use
3	4-7	Number of rows fetched in binary integer format (256 rows is stored as X'00000100')
7	8-11	CPU time consumed (in hundredths of seconds) in binary integer format (1 second is stored as X'00000064')

11	12-15	Current time in packed unsigned format (12:10:46:50 is stored as X'12104650')
15	16-17	Reserved for future use
17	18-80	Same as record types X'01' through X'07' and X'09'

Layout for SQL Text Log file

Offset	Byte Numbers	Description
0	1	Record type (X'08' for SQL text record)
1	2-3	Reserved for future use
3	4-7	Number of rows fetched in binary integer format (256 rows is stored as X'00000100')
7	8-11	CPU time consumed (in hundredths of seconds) in binary integer format (1 second is stored as X'00000064')

Appendix F. HPO DB2 tables

This appendix describes the format of the HPO DB2 tables and the values that can appear in each column of each table.

Object activity summary table layout (Q.OBJ_ACTIVITY_SUMM)

Column Name	Data Type	Description
OBJOWNER	CHAR(8)	Object owner
OBJNAME	VARCHAR(18)	Object name
SSID	CHAR(4)	DB2 subsystem ID
FDATE	DATE	First-used date
FTIME	TIME	First-used time
FTSOID	CHAR(8)	First-used TSOID
FSQLID	CHAR(8)	First-used SQLID
FACTN	CHAR(1)	First-used action: X'01' ERASE; X'02' PRINT; X'03' DISPLAY; X'04' RUN; X'05' EXPORT; X'06' IMPORT; X'07' SAVE; X'09' CONVERT
FENVIRO	CHAR(1)	First-used environment: '2' or '3' TSO, '5' CICS, 'O' Object Manager, 'W' Windows
FMODE	CHAR(1)	First-used mode: '1' online session, '2' batch session
LDATE	DATE	Last-used date
LTIME	TIME	Last-used time
LTSOID	CHAR(8)	Last-used TSOID
LSQLID	CHAR(8)	Last-used SQLID
LACTN	CHAR(1)	Last-used action (see FACTN for values)
LENVIRO	CHAR(1)	Last-used environment (see FENVIRO for values)
LMODE	CHAR(1)	Last-used mode (see FMODE for values)
USE_CT	INTEGER	Number of times object has been used
CAN_CT	INTEGER	Number of times object has been canceled by The HPO/Governor Module
RUN_CT	INTEGER	Number of times object has been run
LMDATE	DATE	Last-modified date

LMTIME	TIME	Last-modified time
LMTSOID	CHAR(8)	Last-modified TSOID
LMSQLID	CHAR(8)	Last-modified SQLID
LMACTN	CHAR(1)	Last-modified action (see FACTN for values)
LMENVIRO	CHAR(1)	Last-modified environment (see FENVIRO for values)
LMMODE	CHAR(1)	Last-modified mode (see FMODE for values)

Note: For data retrieval purposes, a unique index should be created on columns OBJOWNER and OBJNAME.

Object activity detail table layout (Q.OBJ_ACTIVITY_DTL)

Column Name	Data Type	Description
OBJOWNER	CHAR(8)	Object owner
OBJNAME	VARCHAR(18)	Object name
SSID	CHAR(4)	DB2 subsystem ID
DATE	DATE	Date query was run
TIME	TIME	Time query was run
TSOID	CHAR(8)	TSOID running query
SQLID	CHAR(8)	CURRENT SQLID running query
ENVIRO	CHAR(1)	Environment in which query was run: '2' or '3' TSO, '5' CICS
MODE	CHAR(1)	Mode in which query was run: '1' online session, '2' batch session
ROWCT	INTEGER	Number of rows fetched
CPUCT	INTEGER	CPU time consumed (in hundredths of seconds)
SUCCESS	CHAR(1)	One of The HPO/Governor Module Cancel Codes
SQLTEXT	VARCHAR(3500)	SQL Text
ETIME	TIME	Time query ended
IXTIME	INTEGER	HPO internal use

Note: For data retrieval purposes, a unique index should be created on columns OBJOWNER, OBJNAME, DATE, TIME, and IXTIME.

Report registration table layout (Q.REPORTS)

Column Name	Data Type	Description
REPORT_OWNER	CHAR(8)	Report owner
REPORT_NAME	VARCHAR(18)	Report name
RESTRICTED	CHAR(1)	'Y' restricts access to this report; 'N' allows shared access to this report
ENVIRONMENT	CHAR(1)	'B' for batch; 'T' for TSO; 'C' for CICS
LANGUAGE	CHAR(1)	'1' or 'B' for OS/VS COBOL; '2' for VS COBOL II; 'C' for C
DB2_CONNECTION	CHAR(1)	'C' for call attachment facility; 'T' for TSO attachment facility
PLAN_NAME	CHAR(8)	Plan name (optional)
PROGRAM_NAME	CHAR(8)	Program name
LOAD_LIBRARY	VARCHAR(44)	Load library name (optional)
VARIABLES	CHAR(1)	'Y' if this report uses variables; 'N' otherwise
QUERY_OWNER	CHAR(8)	Owner of query that was converted into program
QUERY_NAME	VARCHAR(18)	Name of query that was converted into program
FORM_OWNER	CHAR(8)	Owner of form that was converted into program
FORM_NAME	VARCHAR(18)	Name of form that was converted into program
PROC_OWNER	CHAR(8)	Owner of procedure that was converted into program
PROC_NAME	VARCHAR(18)	Name of procedure that was converted into program
VARIABLE_LRECL	SMALLINT	LRECL of HOSTVARS DD for batch programs
DESCRIPTION	VARCHAR(55)	Description of this report
RDATE	DATE	Date of program registration
RTIME	TIME	Time of program registration

Note: For data retrieval purposes, a unique index should be created on columns REPORT_OWNER and REPORT_NAME.

Report variables table layout (Q.REPORT_VARIABLES)

Column Name	Data Type	Description
REPORT_OWNER	CHAR(8)	Report owner
REPORT_NAME	VARCHAR(18)	Report name
NAME	VARCHAR(31)	Variable name
TYPE	VARCHAR(15)	Variable data type
SEQUENCE	SMALLINT	Sequence number used to order variables

> **Note:** For data retrieval purposes, a unique index should be created on columns REPORT_OWNER, REPORT_NAME, and SEQUENCE.

Appendix G. HPO Activity Log failure reason codes

The following reason codes are recorded in the system log with message prefix RAAG998I whenever an error occurs while processing any of the HPO Activity Log data sets.

Reason Code	Description
2	Load of RAAX configuration module failed
3	Load of RAAXssid configuration module failed
5	Reserved
7	Severe internal error
8	Enqueue failure on HPO Activity Log data set
9	Dynamic allocation failure on HPO Activity Log data set
A	ESTAE routine captured abend while attempting to write to HPO Activity Log data set; data set may be full
B	HPO Activity Log data set DCB verification failed; data set not created or not created with proper attributes
C	Enqueue failure on HPO SQL text data set
D	HPO SQL text data set DCB verification failed; data set not created or not created with proper attributes
E	HPO SQL Text data set open failure
F	Dynamic allocation failure on HPO SQL text data set
G	ESTAE routine captured abend while attempting to write to HPO SQL text data set; data set may be full
O	HPO Activity Log data set open failure
S	SQL error attempting to read Q.OBJECT_DIRECTORY
T	DB2 call attachment failure; User doesn't have authority to execute The HPO/Governor Module plan or plan has not been bound

Appendix H. The HPO/Governor Module cancel codes

The following cancel codes are recorded in the HPO Activity Log and the
Q.OBJ_ACTIVITY_DTL table.

Cancel Code	Description
0	Not canceled
1	Canceled by QMF
2	Canceled by Governor
3	Canceled by the Governor site defined exit routine
4	Canceled by Governor; QMF access not allowed
5	Canceled by Governor; Row limit exceeded
6	Canceled by Governor; CPU time limit exceeded
7	Canceled by Governor; QMF command not allowed
8	Canceled by Governor; SQL verb not allowed
9	Canceled by Governor; User canceled from prompt dialog
A	Canceled by Query Analyzer
B	Canceled by Monitor
C	Canceled by Governor; Idle query timeout exceeded
D	Canceled by Governor; Byte limit exceeded
E	Canceled by QMF; Error occurred
N	Fatal error running query

Appendix I. The RAADEBUG data set

The RAADEBUG data set should be allocated with DSORG=PS, RECFM=F, and LRECL=121.

The record layout for this file is as follows.

Offset	Byte Numbers	Description
0	1	Reserved
1	2-9	TSOID
9	10	Reserved
10	11-18	Current SQLID
18	19	Reserved
19	20-29	Date in YYYY/MM/DD format
29	30	Reserved
30	31-38	Time in HH:MM:SS format
38	39	Reserved
39	40-117	Message
117	118-121	Reserved

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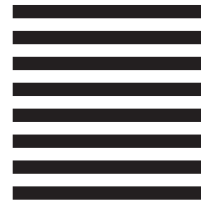Fold and Tape　　　　　　　**Please do not staple**　　　　　　　Fold and Tape

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