

Natural System Commands for DB2

The following system commands have been incorporated into the Natural Tools for DB2:

- **LISTSQL Command**
lists Natural DML statements and their corresponding SQL statements.
 - **LISTSQLB Command**
provides explanations of SQL statements for a specific object.
 - **SQLERR Command**
provides diagnostic information on a DB2 error.
 - **LISTDBRM Command**
displays either a list of DBRMs for a particular Natural program or a list of Natural programs that reference a particular DBRM.
-

LISTSQL Command

Important:

Before you use the LISTSQL command, refer to the section LISTSQL and Explain Functions.

LISTSQL [*object-name*]

The LISTSQL command lists the Natural statements in the source code of a programming object that are associated with a database access, and the corresponding SQL statements into which they have been translated. LISTSQL is issued from the Natural NEXT prompt.

Thus, before executing a Natural program which accesses a DB2 table, you can view the generated SQL code by using the command LISTSQL.

If a valid object name is specified, the object to be displayed must be stored in the library to which you are currently logged on.

If no object name is specified, LISTSQL refers to the object currently in the Natural source area.

The generated SQL statements contained in the specified object are listed one per page.

Sample LISTSQL Screen

```

17:01:25          ***** NATURAL TOOLS FOR SQL *****          1999-09-30
Member RTTB--IN          - LISTSQL -          Library TEST

NATURAL statement at line 0910          Stmt 1 / 7

  FIND SYSCOLUMNS WITH TBCREATOR = #TBCREATOR AND TBNAME = #TBNAME
  SORTED BY COLNO

generated SQL statement  Mode : dynamic  DBRM :          Line 1 / 5

  SELECT NAME, COLNO, COLTYPE, LENGTH, SCALE, NULLS, DEFAULT, KEYSEQ
  FROM SYSSAG.SYSCOLUMNS
  WHERE TBCREATOR = ? AND TBNAME = ?
  ORDER BY COLNO
  FOR FETCH ONLY

Command ==>          Queryno for EXPLAIN 1_____
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
          Error Exit Expl  Parms - +          Prev Next Canc

```

Within the listed results, you can go from one listed SQL statement to another by pressing PF10 (Prev) or PF11 (Next). If a single SQL statement does not fit on the screen, you can scroll backwards or forwards by pressing PF7 or PF8, respectively.

If a static DBRM has been generated, the name of this DBRM is displayed in the DBRM field of the LISTSQL screen; otherwise, the DBRM field remains empty.

If an error occurs, PF2 (Error), which executes the SQLERR command, can be used to provide information on DB2 errors.

With PF4 (Expl), a DB2 EXPLAIN command can be executed for the SQL statement currently listed. The query number (Queryno) for the EXPLAIN command is set to "1" by default, but you can overwrite this default.

With PF6 (Parms), a further screen is displayed which lists all parameters from the SQLDA for the currently displayed SQL statement:

```

17:01:27          ***** NATURAL TOOLS FOR SQL *****          1999-09-30
Member RTTB--IN          - LISTSQL -          Library TEST

      Mode : dynamic   DBRM :          Contoken :

      static parms :

      SQLDA

Nr  Type   Length
1.  CHAR      18          0728 0000 0012 01C5 0000 0000 0601 0000
2.  SMALLINT  2          073A 0000 0002 01F5 0000 0000 0201 0000
3.  CHAR      8          073C 0000 0008 01C5 0000 0000 0201 0000
4.  SMALLINT  2          0744 0000 0002 01F5 0000 0000 0201 0000
5.  SMALLINT  2          0746 0000 0002 01F5 0000 0000 0201 0000
6.  CHAR      1          0748 0000 0001 01C5 0000 0000 0201 0000
7.  CHAR      1          0749 0000 0001 01C5 0000 0000 0201 0000
8.  SMALLINT  2          074A 0000 0002 01F5 0000 0000 0201 0000

1.  CHAR      8          0290 0108 0008 01C4 0000 0000 0000 0000

Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Exit          -          +          Canc
    
```

In static mode, static information is also displayed, which includes the static DBRM name, the DB2 consistency token and some internal static parameters.

DB2 EXPLAIN Command

Important:

Before you use the EXPLAIN command, refer to the section LISTSQL and Explain Functions.

The EXPLAIN command provides information on the DB2 optimizer's choice of strategy for executing SQL statements. For the EXPLAIN command to be executed, a PLAN_TABLE must exist. The information determined by the DB2 optimizer is written into this table. The corresponding explanation is read from the PLAN_TABLE and displayed via the EXPLAIN Result screen.

Sample Explain Result Screen

```

17:02:29          ***** NATURAL TOOLS FOR SQL *****          1999-09-30
Queryno 1          - EXPLAIN Result -                          Row 1 / 2

          Estimated cost :   107.1 timerons

  Qblockno Mixop  Access Match Index  Pre-          Access-          Column-
    Planno seq   type  cols  only fetch  creator      name          fn_eval
  ----
  1      1      I      2          SYSIBM      SAGDCX01
  1      2

          Table
  Tabno Creator      Tname          Tslock
          Method  -- sortn --  -- sortc --
          uq  jo  or  gr  uq  jo  or  gr
  ----
  1      SYSIBM  SYSCOLUMNS  IS
          3      N  N  N  N  N  N  N  N  N  N  Y  N

Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
          Exit  Info          -      +          Canc

```

If an explanation does not fit on one screen, you can scroll backwards and forwards by pressing PF7 or PF8, respectively.

The value in the Estimated cost field is taken from SQLERRD (4) in the SQLCA; it is a rough estimate of the required resources.

With PF4 (Info), the additional information that is provided with the EXPLAINB command is displayed.

LISTSQLB Command

Important:

Before you use the LISTSQLB command, refer to the section LISTSQL and Explain Functions.

The command LISTSQLB can be executed in batch mode or issued online from the Natural NEXT line.

If executed online, the following screen is invoked:

```

16:54:35          ***** NATURAL Tools for SQL *****          1999-09-30
                    - LISTSQLB -

                                Code Function

                                X   Explain all SQL Statements
                                .   Exit

Code .. _   Member ... _____
            Queryno .. 1_____

Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
                    Exit                                          Canc

```

By specifying a valid member name, the explanation of SQL statements can be limited to certain member(s); an asterisk (*) can be used for range specification:

- If you specify a unique member name, all SQL statements contained in this member are explained;
- If you specify a value followed by an asterisk, all SQL statements contained in all members with names beginning with the specified value are explained;
- If you specify an asterisk only (or leave the field blank), all SQL statements of all existing SQL members are explained.

A query number must be specified, so that with each issued EXPLAIN command, the newly created explanation is added to the appropriate query number. The default query number is 1.

To issue the LISTSQL command, enter function code "X" and specify a valid member name and query number; all SQL statements contained in the specified member(s) are explained.

If LISTSQLB is executed online, the following screen informs you about the processing status of the command and if any errors have occurred.

```
16:55:24          ***** NATURAL Tools for SQL *****          1999-09-30
                    - LISTSQLB -
Queryno : 1                      Member  Stmtno Message

Current Object :
Library      TEST
Member      RTTB--IN

Statistics :
Members read  1
  with SQL    1
SQL statements 7

      Member  Message

      RTTB--IN OK

Press ENTER to continue
Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
```

If executed in batch mode, error messages are written to a dataset referred to by DD name CMPRINT (logical printer 0).

SQLERR Command

The SQLERR command is used to obtain diagnostic information on a DB2 error.

When a DB2 error occurs, Natural issues an appropriate error message. When you enter the SQLERR command, the following information on the most recent DB2 error is displayed:

- the Natural error message number;
- the corresponding reason code (if applicable);
- the variables SQLSTATE and SQLCODE returned by DB2;
- the DB2 error message.

The SQLERR command can be issued either from the Natural NEXT prompt or from within a Natural program (by using the FETCH statement).

Sample SQLERR Diagnostic Information Screen

```

          ***** SQLERR Diagnostic Information *****
----- NATURAL SQL Interface Codes -----
Return Code: 3700      Reason Code: 0      SQLSTATE : 52003      SQL code : -206
----- SQLCA-----
SQLERRP (DB2 Sub routine where error occurred)      : DSNXOGP
SQLERRD (DB2 Internal State)
  RDS Return Code      :          700
  DBSS Return Code     :          0
  Number of Rows Processed :          0
  Estimated Cost       :          11.2
  Syntax error on PREPARE or EXECUTE IMMEDIATE     :          0
  Buffer Manager ERROR Code :          0
SQLWARN (Warning Flags)
  Data truncated
  Null Values ignored (AVG,SUM,MAX,MIN)           :
  No. of columns greater than no. of host variables :
  UPDATE/DELETE without WHERE clause             :
  SQL Statement not valid in DB2                  :
  Adjustment to DATE/TIMESTAMP Variable made     :
DB2 Error Message :
DSNT4081 SQLCODE = -206, ERROR: THE OBJECT TABLE OR VIEW OF THE INSERT,
DELETE, OR UPDATE STATEMENT IS ALSO IDENTIFIED IN A FROM CLAUSE

```

LISTDBRM Command

The LISTDBRM command is used to display either existing DBRMs of Natural programs or Natural programs referencing a given DBRM.

Important:

LISTDBRM has to be issued from library SYSDDB2, which means you have to LOGON to SYSDDB2 first and then enter the command LISTDBRM.

The following menu is displayed:

```

16:53:20          ***** NATURAL Tools for SQL *****          1999-09-30
                    - List DBRM -

Code Function

D   Display DBRMs of Programs
R   List Programs Referencing DBRM
?   Help
.   Exit

Code .. _   Library .. EXAMPLE_
          Member .. _____
          DBRM ..... _____

Command ==>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help           Exit                               Canc

```

The following functions are available:

Code	Description
D	Displays programs with DB2 access and their corresponding DBRM. If no DBRM name is shown, the corresponding program uses dynamic SQL.
R	Lists all programs that use a given DBRM. If no DBRM name is specified, all programs that use dynamic SQL are listed.

The following parameters apply:

Parameter	Description
Library	Specifies the name of a Natural library. Library names beginning with "SYS" are not permitted. This parameter must be specified.
Member	Specifies the name of the Natural program (member) to be displayed. This parameter is optional and can be used to limit the output. If a value is specified followed by an asterisk (*), all members in the specified library with names beginning with this value are listed. If the Member field is left blank, or if an asterisk is specified only, all members in the specified library are listed.
DBRM	Specifies a valid DBRM name. If left blank, programs that run dynamically are referenced. This parameter applies to function code "R" only.

Sample List DBRM Result Screen

16:53:20	***** LISTDBRM Command *****					1999-04-26
Library	Name	Type	DBRM	User ID	Date	Time
-----	-----	-----	-----	-----	-----	-----
EXAMPLE	PROG1	Program	PACK1	SAG	1996-07-17	11:10:43
EXAMPLE	PROG2	Program	PACK1	SAG	1996-07-17	11:10:48
EXAMPLE	PROG3	Program	PACK2	SAG	1995-07-17	11:11:04
EXAMPLE	PROG4	Program		SAG	1993-07-17	11:11:07