

Using Natural Statements and System Variables

This section contains special considerations concerning Natural data manipulation language (DML) statements (that is, Natural native DML statements and Natural SQL DML statements), and Natural system variables when used with SQL.

It mainly consists of information also contained in the Natural basic documentation set where each Natural statement and variable is described in detail.

For an explanation of the symbols used in this section to describe the syntax of Natural statements, see *Syntax Symbols* in the *Natural Statements* documentation.

For information on logging SQL statements contained in a Natural program, refer to *DBLOG Trace Screen for SQL Statements* in the *DBLOG Utility* documentation.

This section covers the following topics:

- Special Register Consideration
 - Using Natural Native DML Statements
 - Using Natural SQL Statements
 - Using Natural System Variables
 - Error Handling
-

Special Register Consideration

Natural SQL Gateway supports the following special registers, which can be set via the `PROCESS SQL` statement:

- SCHEMA

The SCHEMA special register determines the implicitly first level qualifier of table names, that is, the schema or creator name of the table, if the first qualifier is not explicitly specified. The SCHEMA special register could be set by `PROCESS SQL ddm-name << SET SCHEMA = :hv>>`, where *ddm-name* denotes the DDM whose DBID is mapped to type CNX and *:hv* denotes an alphanumeric variable containing the first level qualifier.

The SCHEMA special register cannot be retrieved or interrogated by SQL statements.

- CATALOG

The CATALOG special register determines the implicitly second level qualifier of table names, that is, the location or database name of the table, if the second level qualifier is not explicitly specified. The CATALOG special register could be set by `PROCESS SQL ddm-name << SET CATALOG = :hv>>`, where *ddm-name* denotes DDM whose DBID is mapped to type CNX and *:hv* denotes a alphanumeric variable containing the second level qualifier.

The CATALOG special register could not be retrieved or interrogated by SQL statements.

- RCI_VERSION

The RCI_VERSION is an alphanumeric character string containing the version of the remote client interface used to communicate with the CONNX JDBC server. The RCI_VERSION is a read-only special register which could be retrieved by `PROCESS SQL ddm-name <<GET :hv = RCI_VERSION>>`, where *ddm-name* denotes a DDM whose DBID is mapped to type CNX and *hv* denotes a alphanumeric variable. The RCI_VERSION string has the following format:

```
RCI: 4.1.1.1 CONNX 10.5 SP2 (build 7294)
```

Using Natural Native DML Statements

This section summarizes particular points you have to consider when using Natural DML statements with SQL. Any Natural statement *not* mentioned in this section can be used with SQL without restriction.

- BACKOUT TRANSACTION
- DELETE
- END TRANSACTION
- FIND
- GET
- HISTOGRAM
- READ
- STORE
- UPDATE

BACKOUT TRANSACTION

The Natural native DML statement `BACKOUT TRANSACTION` undoes all database modifications made since the beginning of the last logical transaction. Logical transactions can start either after the beginning of a session or after the last `SYNCPOINT`, `END TRANSACTION`, or `BACKOUT TRANSACTION` statement.

How the statement is translated and which command is actually issued depends on the TP-monitor environment:

- In batch mode and under TSO, the `BACKOUT TRANSACTION` statement is translated into an SQL `ROLLBACK` command.

As all cursors are closed when a logical unit of work ends, a `BACKOUT TRANSACTION` statement must not be placed within a database loop; instead, it has to be placed outside such a loop or after the outermost loop of nested loops.

If an external program written in another standard programming language is called from a Natural program, this external program must not contain its own ROLLBACK command if the Natural program issues database calls, too. The calling Natural program must issue the BACKOUT TRANSACTION statement for the external program.

If a program tries to backout updates which have already been committed, for example by a terminal I/O, a corresponding Natural error message (NAT3711) is returned.

DELETE

The Natural native DML statement DELETE is used to delete a row from an SQL table which has been read with a preceding FIND, READ, or SELECT statement. It corresponds to the SQL statement DELETE WHERE CURRENT OF *cursor-name*, which means that only the row which was read last can be deleted.

Example:

```
FIND EMPLOYEES WITH NAME = 'SMITH'
      AND FIRST_NAME = 'ROGER'
DELETE
```

Natural would translate the above Natural statements into SQL and assign a cursor name (for example, CURSOR1) as follows:

```
DECLARE CURSOR1 CURSOR FOR
SELECT FROM EMPLOYEES
      WHERE NAME = 'SMITH' AND FIRST_NAME = 'ROGER'
DELETE FROM EMPLOYEES
      WHERE CURRENT OF CURSOR1
```

Both the SELECT and the DELETE statement refer to the same cursor.

Natural translates a DML DELETE statement into an SQL DELETE statement in the same way it translates a FIND statement into an SQL SELECT statement.

A row read with a FIND SORTED BY cannot be deleted due to SQL restrictions explained with the FIND statement. A row read with a READ LOGICAL cannot be deleted either.

DELETE when using the File Server

If a row rolled out to the file server is to be deleted, Natural rereads automatically the original row from the database to compare it with its image stored in the file server. If the original row has not been modified in the meantime, the DELETE operation is performed. With the next terminal I/O, the transaction is terminated, and the row is deleted from the actual database.

If the DELETE operates on a scrollable cursor, the row on the file server is marked as DELETE hole and is deleted from the base table.

However, if any modification is detected, the row will not be deleted and Natural issues the NAT3703 error message for non-scrollable cursors.

Since a DELETE statement requires that Natural rereads a single row, a unique index must be available for the respective table. All columns which comprise the unique index must be part of the corresponding Natural view.

END TRANSACTION

The Natural native DML statement `END TRANSACTION` indicates the end of a logical transaction and releases all SQL data locked during the transaction. All data modifications are committed and made permanent.

How the statement is translated and which command is actually issued depends on the TP-monitor environment:

- In batch mode and under TSO, the `END TRANSACTION` statement is translated into an `SQL COMMIT WORK` command.

An `END TRANSACTION` statement must not be placed within a database loop, since all cursors are closed when a logical unit of work ends. Instead, it has to be placed outside such a loop or after the outermost loop of nested loops.

If an external program written in another standard programming language is called from a Natural program, this external program must not contain its own `COMMIT` command if the Natural program issues database calls, too. The calling Natural program must issue the `END TRANSACTION` statement for the external program.

Note:

Transaction data cannot be written to SQL databases.

FIND

The Natural native DML statement `FIND` corresponds to the SQL `SELECT` statement.

Example:

Natural statements:

```
FIND EMPLOYEES WITH NAME = 'BLACKMORE'
      AND AGE EQ 20 THRU 40
OBTAIN PERSONNEL_ID NAME AGE
```

Equivalent SQL statements:

```
SELECT PERSONNEL_ID, NAME, AGE
FROM EMPLOYEES
WHERE NAME = 'BLACKMORE'
      AND AGE BETWEEN 20 AND 40
```

Natural internally translates a `FIND` statement into an SQL `SELECT` statement as described in *Processing of SQL Statements Issued by Natural* in the section *Internal Handling of Dynamic Statements*. The `SELECT` statement is executed by an `OPEN CURSOR` statement followed by a `FETCH` command. The `FETCH` command is executed repeatedly until either all records have been read or the program flow exits the `FIND` processing loop. A `CLOSE CURSOR` command ends the `SELECT` processing.

The `WITH` clause of a `FIND` statement is converted to the `WHERE` clause of the `SELECT` statement. The basic search criterion for an SQL table can be specified in the same way as for an Adabas file. This implies that only database fields which are defined as descriptors can be used to construct basic search criteria and that descriptors cannot be compared with other fields of the Natural view (that is, database fields) but only with program variables or constants.

Note:

As each database field (column) of an SQL table can be used for searching, any database field can be defined as a descriptor in a Natural DDM.

The WHERE clause of the FIND statement is evaluated by Natural after the rows have been selected via the WITH clause. Within the WHERE clause, non-descriptors can be used and database fields can be compared with other database fields.

Note:

SQL tables do not have sub-, super-, or phonetic descriptors.

A FIND NUMBER statement is translated into a SELECT statement containing a COUNT (*) clause. The number of rows found is returned in the Natural system variable *NUMBER as described in the Natural *System Variables* documentation.

The FIND UNIQUE statement can be used to ensure that only one record is selected for processing. If the FIND UNIQUE statement is referenced by an UPDATE statement, a non-cursor (searched) UPDATE operation is generated instead of a cursor-oriented (positioned) UPDATE operation. Therefore, it can be used if you want to update an SQL primary key. It is, however, recommended to use Natural SQL Searched UPDATE statement to update a primary key.

In static mode, the FIND NUMBER and FIND UNIQUE statements are translated into a SELECT SINGLE statement as described in the section *Natural SQL Statements*.

The FIND FIRST statement cannot be used. The PASSWORD, CIPHER, COUPLED and RETAIN clauses cannot be used either.

The SORTED BY clause of a FIND statement is translated into the SQL SELECT . . . ORDER BY clause, which follows the search criterion. Because this produces a read-only result table, a row read with a FIND statement that contains a SORTED BY clause cannot be updated or deleted.

A limit on the depth of nested database loops can be specified at installation time. If this limit is exceeded, a Natural error message is returned.

FIND when Using the File Server

As far as the file server is concerned, there are no programming restrictions with selection statements. It is, however, recommended to make yourself familiar with its functionality considering performance and file server space requirements.

GET

The Natural native DML statement GET is based on Adabas internal sequence numbers (ISNs) and therefore cannot be used with SQL tables.

HISTOGRAM

The Natural DML statement HISTOGRAM returns the number of rows in a table which have the same value in a specific column. The number of rows is returned in the Natural system variable *NUMBER as described in Natural *System Variables* documentation.

Example:

Natural native DML statements:

```
HISTOGRAM EMPLOYEES FOR AGE
OBTAIN AGE
```

Equivalent Natural SQL statement:

```
SELECT COUNT(*) , AGE FROM EMPLOYEES
WHERE AGE > -999
GROUP BY AGE
ORDER BY AGE
```

Natural translates the HISTOGRAM statement into an SQL SELECT statement, which means that the control flow is similar to the flow explained for the FIND statement.

READ

The Natural DML statement READ can also be used to access SQL tables. Natural translates a READ statement into an SQL SELECT statement.

READ PHYSICAL and READ LOGICAL can be used; READ BY ISN, however, cannot be used, as there is no SQL equivalent to Adabas ISNs. The PASSWORD and CIPHER clauses cannot be used either.

Since a READ LOGICAL statement is translated into a SELECT . . . ORDER BY statement - which produces a read-only table -, a row read with a READ LOGICAL statement cannot be updated or deleted (see Example 1). The start value can only be a constant or program variable; any other field of the Natural view (that is, any database field) cannot be used.

A READ PHYSICAL statement is translated into a SELECT statement without an ORDER BY clause and can therefore be updated or deleted (see Example 2).

Example 1:

Natural native DML statements:

```
READ PERSONNEL BY NAME
OBTAIN NAME FIRSTNAME DATEOFBIRTH
```

Equivalent Natural SQL statements:

```
SELECT NAME, FIRSTNAME, DATEOFBIRTH FROM PERSONNEL
WHERE NAME >= ' '
ORDER BY NAME
```

Example 2:

Natural native DML statements:

```
READ PERSONNEL PHYSICAL
OBTAIN NAME
```

Equivalent Natural SQL statement:

```
SELECT NAME FROM PERSONNEL
```

If the READ statement contains a WHERE clause, this clause is evaluated by the Natural processor after the rows have been selected according to the descriptor value(s) specified in the search criterion.

READ when Using the File Server

As far as the file server is concerned there are no programming restrictions with selection statements. It is, however, recommended to make yourself familiar with its functionality considering performance and file server space requirements.

STORE

The Natural DML statement STORE is used to add a row to an SQL table. The STORE statement corresponds to the SQL statement INSERT.

Example:

Natural native DML statements:

```
STORE RECORD IN EMPLOYEES
  WITH PERSONNEL_ID = '2112'
      NAME           = 'LIFESON'
      FIRST_NAME     = 'ALEX'
```

Equivalent Natural SQL statements:

```
INSERT INTO EMPLOYEES (PERSONNEL_ID, NAME, FIRST_NAME)
  VALUES ('2112', 'LIFESON', 'ALEX')
```

The PASSWORD, CIPHER and USING/GIVING NUMBER clauses cannot be used.

UPDATE

The Natural DML UPDATE statement updates a row in an SQL table which has been read with a preceding FIND, READ, or SELECT statement. It corresponds to the SQL statement UPDATE WHERE CURRENT OF *cursor-name* (positioned UPDATE), which means that only the row which was read last can be updated.

UPDATE when Using the File Server

If a row rolled out to the file server is to be updated, Natural automatically rereads the original row from the database to compare it with its image stored in the file server. If the original row has not been modified in the meantime, the UPDATE operation is performed. With the next terminal I/O, the transaction is terminated and the row is definitely updated on the database.

If the UPDATE operates on a scrollable cursor, the row on the file server and the row in the base table are updated. If the row no longer qualifies for the search criteria of the related SELECT statement after the update, the row is marked as UPDATE hole on the file server.

However, if any modification is detected, the row will not be updated and Natural issues the NAT3703 error message.

Since an UPDATE statement requires rereading a single row by Natural, a unique index must be available for this table. All columns which comprise the unique index must be part of the corresponding Natural view.

UPDATE with FIND/READ

As explained with the FIND statement, Natural translates a FIND statement into an SQL SELECT statement. When a Natural program contains a Natural native DML UPDATE statement, this statement is translated into an SQL UPDATE statement and a FOR UPDATE OF clause is added to the SELECT statement.

Example:

```
FIND EMPLOYEES WITH SALARY < 5000
  ASSIGN SALARY = 6000
  UPDATE
```

Natural would translate the above Natural statements into SQL and assign a cursor name (for example, CURSOR1) as follows:

```
DECLARE CURSOR1 CURSOR FOR
SELECT SALARY FROM EMPLOYEES WHERE SALARY < 5000
  FOR UPDATE OF SALARY
UPDATE EMPLOYEES SET SALARY = 6000
  WHERE CURRENT OF CURSOR1
```

Both the SELECT and the UPDATE statement refer to the same cursor.

Due to SQL logic, a column (field) can only be updated if it is contained in the FOR UPDATE OF clause; otherwise updating this column (field) is rejected. Natural includes automatically all columns (fields) into the FOR UPDATE OF clause which have been modified anywhere in the Natural program or which are input fields as part of a Natural map.

However, an SQL column is not updated if the column (field) is marked as "not updateable" in the Natural DDM. Such columns (fields) are removed from the FOR UPDATE OF list without any warning or error message. The columns (fields) contained in the FOR UPDATE OF list can be checked with the LISTSQL command.

The Adabas short name in the Natural DDM determines whether a column (field) can be updated.

The following table shows the ranges that apply:

Short-Name Range	Type of Field
AA - N9	non-key field that can be updated.
Aa - Nz	non-key field that can be updated.
OA - O9	primary key field.
PA - P9	ascending key field that can be updated.
QA - Q9	descending key field that can be updated.
RA - X9	non-key field that cannot be updated.
Ra - Xz	non-key field that cannot be updated.
YA - Y9	ascending key field that cannot be updated.
ZA - Z9	descending key field that cannot be updated.
1A - 9Z	non-key field that cannot be updated.
1a - 9z	non-key field that cannot be updated.

Be aware that a primary key field is never part of a `FOR UPDATE OF` list. A primary key field can only be updated by using a non-cursor `UPDATE` operation (see also `UPDATE` in the section *Natural SQL Statements*).

A row read with a `FIND` statement that contains a `SORTED BY` clause cannot be updated (due to SQL limitations as explained with the `FIND` statement). A row read with a `READ LOGICAL` cannot be updated either (as explained with the `READ` statement).

If a column is to be updated which is redefined as an array, it is strongly recommended to update the whole column and not individual occurrences; otherwise, results are not predictable. To do so, in reporting mode you can use the `OBTAIN` statement (as described in the *Natural Statements* documentation), which must be applied to all field occurrences in the column to be updated. In structured mode, however, all these occurrences must be defined in the corresponding Natural view.

The data locked by an `UPDATE` statement are released when an `END TRANSACTION (COMMIT WORK)` or `BACKOUT TRANSACTION (ROLLBACK WORK)` statement is executed by the program.

Note:

If a length indicator field or `NULL` indicator field is updated in a Natural program without updating the field (column) it refers to, the update of the column is not generated for SQL and thus no updating takes place.

UPDATE with SELECT

In general, the DML `UPDATE` statement can be used in both structured and reporting mode. However, after a `SELECT` statement, only the syntax defined for Natural structured mode is allowed:

```
UPDATE [ RECORD ] [ IN ] [ STATEMENT ] [( r )]
```

This is due to the fact that in combination with the `SELECT` statement, the DML `UPDATE` statement is only allowed in the special case of:

```

...
SELECT ...
  INTO VIEW view-name
...

```

Thus, only a whole Natural view can be updated; individual columns (fields) cannot.

Example:

```

DEFINE DATA LOCAL
01 PERS VIEW OF SQL-PERSONNEL
  02 NAME
  02 AGE
END-DEFINE

SELECT *
  INTO VIEW PERS
  FROM SQL-PERSONNEL
  WHERE NAME LIKE 'S%'

  IF NAME = 'SMITH'
    ADD 1 TO AGE
  UPDATE
  END-IF

END-SELECT
...

```

In combination with the Natural native DML UPDATE statement, any other form of the SELECT statement is rejected and an error message is returned.

In all other respects, the Natural native DML UPDATE statement can be used with the SELECT statement in the same way as with the Natural FIND statement described earlier in this section and in the *Natural Statements* documentation.

Using Natural SQL Statements

This section covers points you have to consider when using Natural SQL statements with Natural SQL Gateway. These SQL specific points mainly consists in syntax restrictions or enhancements which belong to the Extended Set of Natural SQL syntax. The Extended Set is provided in addition to the Common Set to support database specific features; see *Common Set and Extended Set* in the section *SQL Statements* in the *Natural Statements* documentation.

This section covers the following topics:

- Syntactical Items Common to Natural SQL Statements
- COMMIT - SQL
- DELETE - SQL
- INSERT - SQL

- PROCESS SQL
- ROLLBACK - SQL
- SELECT - SQL
- UPDATE - SQL

Syntactical Items Common to Natural SQL Statements

The following common syntactical items are either Natural SQL Gateway (NSB) specific and do not conform to the standard SQL syntax definitions (that is, to the Common Set of Natural SQL syntax) or impose restrictions when used with Natural SQL Gateway (see also *SQL Statements* in the *Natural Statements* documentation).

This section covers the following topics:

- atom
- factor
- scalar-function
- column-function
- scalar-operator
- special-register
- case-expression

atom

An atom can be either a parameter (that is, a Natural program variable or host variable) or a constant.

factor

The following factors are specific to Natural SQL Gateway and belong to the Natural Extended Set:

special-register
scalar-function (scalar-expression, ...)
case-expression

scalar-function

A scalar function is a built-in function that can be used in the construction of scalar computational expressions. Scalar functions are specific to Natural SQL Gateway and belong to the Natural Extended Set.

See the *CONNX Users Guide* for available scalar functions.

Each scalar function is followed by one or more scalar expressions in parentheses. The number of scalar expressions depends upon the scalar function. Multiple scalar expressions must be separated from one another by commas.

Example:

```
SELECT NAME
  INTO NAME
  FROM SQL-PERSONNEL
  WHERE SUBSTR ( NAME, 1, 3 ) = 'Fri'
  ...
```

column-function

A column function returns a single-value result for the argument it receives. The argument is a set of like values, such as the values of a column. Column functions are also called aggregating functions.

The following column functions conform to standard SQL.

```
AVG
COUNT
MAX
MIN
SUM
```

scalar-operator

The concatenation operator (CONCAT or "||") does not conform to standard SQL and belongs to the Extended Set.

special-register

The following special registers do not conform to standard SQL and belong to the Extended Set:

```
USER
```

A reference to a special register returns a scalar value.

case-expression

$\text{CASE } \left\{ \begin{array}{l} \text{searched-when-clause ...} \\ \text{simple-when-clause} \end{array} \right\} \left[\text{ELSE } \left\{ \begin{array}{l} \text{NULL} \\ \text{scalar expression} \end{array} \right\} \right] \text{END}$
--

case-expressions do not conform to standard SQL and are therefore supported by the Natural SQL Extended Set only.

Example:

```
DEFINE DATA LOCAL
01 #EMP
02 #EMPNO (A10)
02 #FIRSTNME (A15)
02 #MIDINIT (A5)
02 #LASTNAME (A15)
02 #EDLEVEL (A13)
02 #INCOME (P7)
END-DEFINE
SELECT EMPNO, FIRSTNME, MIDINIT, LASTNAME,
      (CASE WHEN EDLEVEL < 15 THEN 'SECONDARY'
           WHEN EDLEVEL < 19 THEN 'COLLEGE'
```

```

        ELSE                'POST GRADUATE'
    END ) AS EDUCATION, SALARY + COMM AS INCOME
INTO
#EMPNO, #FIRSTNME, #MIDINIT, #LASTNAME,
#EDLEVEL, #INCOME
FROM DSN8510-EMP
WHERE (CASE WHEN SALARY = 0 THEN NULL
        ELSE SALARY / COMM
        END ) > 0.25

DISPLAY #EMP
END-SELECT
END

```

COMMIT - SQL

The Natural SQL COMMIT statement indicates the end of a logical transaction and releases all SQL data locked during the transaction. All data modifications are made permanent.

COMMIT is a synonym for the Natural native DML statement END TRANSACTION as described in the section *Using Natural DML Statements*.

No transaction data can be provided with the COMMIT statement.

If the file server is used, an implicit end-of-transaction is issued after each terminal I/O.

If an external program written in another standard programming language is called from a Natural program, this external program must not contain its own COMMIT command if the Natural program issues database calls, too. The calling Natural program must issue the COMMIT statement for the external program.

For further details and statement syntax, see *COMMIT - SQL* in the *Natural Statements* documentation.

DELETE - SQL

Both the cursor-oriented or positioned DELETE, and the non-cursor or searched DELETE SQL statements are supported as part of Natural SQL Gateway; the functionality of the positioned DELETE statement corresponds to that of the Natural DML DELETE statement.

With Natural SQL Gateway, a table name in the FROM clause of a searched DELETE statement can be assigned a correlation-name. This does not correspond to the standard SQL syntax definition and therefore belongs to the Natural Extended Set.

The searched DELETE statement must be used, for example, to delete a row from a self-referencing table, since with self-referencing tables a positioned DELETE is not allowed by Natural SQL Gateway.

For further details and statement syntax, see *DELETE - SQL* in the *Natural Statements* documentation.

INSERT - SQL

The Natural SQL INSERT statement is used to add one or more new rows to a table.

Since the INSERT statement can contain a select expression, all the syntactical items described in the section *Syntactical Items Common to Natural SQL Statements* apply.

For further details and statement syntax, see *INSERT - SQL* in the *Natural Statements* documentation.

PROCESS SQL

The Natural `PROCESS SQL` statement is used to issue SQL statements to the underlying database. The statements are specified in a statement-string, which can also include constants and parameters.

The set of statements which can be issued is also referred to as Flexible SQL and comprises those statements which can be issued with the SQL statement `EXECUTE`.

In addition, Flexible SQL includes the following Natural SQL Gateway specific statements:

```
CONNECT
SET CATALOG
SET SCHEMA
GET host-variable = RCI_VERSION
```

For further details and statement syntax, see *PROCESS SQL* in the *Natural Statements* documentation.

CONNECT

The `CONNECT` statement establishes a connection to the CONNX JDBC server. It has to be executed before any SQL statement is issued against the CONNX JDBC server.

Syntax

```
PROCESS SQL dcm << CONNECT TO :U:server USER :U:user PASSWORD :U:password >>
```

Parameter	Format/Length	Explanation
<i>dcm</i>	Constant 1-32 characters	Specifies the name of a DDM whose DBID is mapped by NTDBID to type SQL and mapped by NTDBID to type CNX.
<i>server</i>	A1 to A128	Specifies a string addressing the CONNX JDBC server , the port number the server listens to and the CDD to be used to access the RDBMS. The string has to have the following format: <i>GATEWAY=location-name;PORT=number;DD=cdd-registered-name</i> <i>location-name</i> denotes the the TCP/IP name of the location where the CONNX JDBC server resides. <i>number</i> denotes the port number the CONNX JDBC server listens to. Default port number is 7500. <i>cdd-registered-name</i> denotes the CDD to be used for this connection. It is a registry name entry, which is mapped to file name in the registry.
<i>user</i>	A1 to A32	Denotes the user ID to logon to the CONNX JDBC server or RDBMS.
<i>password</i>	A1 to A32	Denotes the password to logon to the CONNX JDBC server or RDBMS.

SET CATALOG

Syntax

```
PROCESS SQL ddm << SET CATALOG :U:catalog >>
```

The SET CATALOG statement sets the default catalog to the catalog identified by *catalog*. The default catalog will be used to identify the database system to be accessed, if the database system is not explicitly specified as first qualifier of a table name in the SQL syntax and if the CDD contains definitions of more than one database system.

Parameter	Format/Length	Explanation
<i>d</i> dm	Constant 1-32 characters	Specifies the name of a DDM whose DBID is mapped by NTDBID to type SQL and mapped by NTDBID to type CNX.
<i>catalog</i>	A1 to A32	Denotes the catalog name to be used as default catalog.

SET SCHEMA

Syntax

```
PROCESS SQL ddm << SET SCHEMA :U:schema >>
```

The SET SCHEMA statement sets the default schema to the schema identified by *schema*. The default schema will be used to identify the schema to be accessed, if the schema is not explicitly specified as qualifier of a table name in the SQL syntax and if the CDD contains definitions of more than one schema.

Parameter	Format/Length	Explanation
<i>d</i> dm	Constant 1-32 characters	Specifies the name of a DDM whose DBID is mapped by NTDBID to type SQL and mapped by NTDBID to type CNX.
<i>schema</i>	A1 to A32	Denotes the schema name to be used as default schema.

GET *host-variable* = RCI_VERSION

Syntax

```
PROCESS SQL ddm << GET:G:version = RCI_VERSION >>
```

The GET RCI_VERSION statement retrieves the version of the CONNX client software used in the actual session. It could be executed before any connection is established.

Parameter	Format/Length	Explanation
<i>d</i> dm	Constant 1-32 characters	Specifies the name of a DDM whose DBID is mapped by NTDBID to type SQL and mapped by NTDBID to type CNX.
<i>version</i>	A1 to A128	Receives the version string of the CONNX client software. It looks like the following: RCI: 4.1.1 CONNX 10.5 SP3 (build 8003).

To avoid transaction synchronization problems between the Natural environment and SQL, the COMMIT and ROLLBACK statements must not be used within PROCESS SQL.

For further details and statement syntax, see PROCESS SQL in the Natural *Statements* documentation.

ROLLBACK - SQL

The Natural SQL ROLLBACK statement undoes all database modifications made since the beginning of the last logical transaction. Logical transactions can start either after the beginning of a session or after the last COMMIT/END TRANSACTION or ROLLBACK/BACKOUT TRANSACTION statement. All records held during the transaction are released.

ROLLBACK is a synonym for the Natural statement BACKOUT TRANSACTION as described in the section *Using Natural DML Statements*.

However, if the file server is used, only changes made to the database since the last terminal I/O are undone.

As all cursors are closed when a logical unit of work ends, a ROLLBACK statement must not be placed within a database loop; instead, it has to be placed outside such a loop or after the outermost loop of nested loops.

If an external program written in another standard programming language is called from a Natural program, this external program must not contain its own ROLLBACK command if the Natural program issues database calls, too. The calling Natural program must issue the ROLLBACK statement for the external program.

For further details and statement syntax, see *ROLLBACK -SQL* in the Natural *Statements* documentation.

SELECT - SQL

The Natural SQL SELECT statement supports both the cursor-oriented selection, which is used to retrieve an arbitrary number of rows, and the non-cursor selection (singleton SELECT), which retrieves at most one single row.

For further details and statement syntax, see *SELECT - SQL* in the Natural *Statements* documentation.

SELECT - Cursor-Oriented

Like the Natural native DML FIND statement, the cursor-oriented SELECT statement is used to select a set of rows (records) from one or more SQL tables, based on a search criterion. Since a database loop is initiated, the loop must be closed by a LOOP (in reporting mode) or END-SELECT statement (in structured mode). With this construction, Natural uses the same loop processing as with the FIND statement. In addition, no cursor management is required from the application program; it is automatically handled by Natural.

For further details and syntax, see *SELECT - SQL, Syntax 1 - Cursor-Oriented Selection* in the Natural *Statements* documentation.

SELECT SINGLE - Non-Cursor-Oriented

The Natural SQL statement `SELECT SINGLE` provides the functionality of a non-cursor selection (Singleton `SELECT`); that is, a select expression that retrieves at most one row without using a cursor.

Since SQL supports the Singleton `SELECT` command in static SQL only, in dynamic mode, the Natural `SELECT SINGLE` statement is executed in the same way as a set-level `SELECT` statement, which results in a cursor operation. However, Natural checks the number of rows returned by SQL. If more than one row is selected, a corresponding error message is returned.

For further details and syntax, see *SELECT - SQL, Syntax 2 - Non-Cursor Selection* in the Natural *Statements* documentation.

UPDATE - SQL

Both the cursor-oriented or positioned `UPDATE` and the non-cursor or Searched `UPDATE SQL` statements are supported as part of Natural SQL. Both of them reference either a table or a Natural view.

With SQL, the name of a table or Natural view to be referenced by a searched `UPDATE` can be assigned a correlation-name. This does not correspond to the standard SQL syntax definition and therefore belongs to the Natural Extended Set.

The Searched `UPDATE` statement must be used, for example, to update a primary key field, since SQL does not allow updating of columns of a primary key by using a positioned `UPDATE` statement.

Note:

If you use the `SET *` notation, all fields of the referenced Natural view are added to the `FOR UPDATE OF` and `SET` lists. Therefore, ensure that your view contains only fields which can be updated; otherwise, a negative `SQLCODE` is returned by SQL.

For further details and syntax, see *UPDATE - SQL* in the Natural *Statements* documentation.

Using Natural System Variables

When used with SQL, there are restrictions and/or special considerations concerning the following Natural system variables:

- `*ISN`
- `*NUMBER`
- `*ROWCOUNT`

For information on restrictions and/or special considerations, refer to the section *Database-Specific Information* in the corresponding system variable documentation.

Error Handling

In contrast to the normal Natural error handling, where either an `ON ERROR` statement is used to intercept execution time errors or standard error message processing is performed and program execution is terminated, the enhanced error handling of Natural SQL Gateway provides an application controlled reaction to the encountered SQL error.

Two Natural subprograms, NDBERR and NDBNOERR, are provided to disable the usual Natural error handling and to check the encountered SQL error for the returned SQL code.

For further information on Natural subprograms provided for SQL, see the section *Interface Subprograms*.