

Modifying Data

DB2 Advanced SQL for JAVA Developers

Modifying Data

Chapter 2:

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Objectives

You will learn:

- Views and expressions.
- How to utilize the different inserts - single row, from another table, and inserting data into a ROWID Column.
- Inserting with the DEFAULT keyword.
- Inserting using expressions.
- Inserting with self-referencing SELECT.
- Utilizing DELETES.
- Mass update.
- Updates using SELECT.

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Views and Expressions

- A view, nickname, or SQL expression can be inserted into a table.
- For views and SQL expressions, the following rules apply:
 - The list of columns selected cannot include a column function (e.g. MIN).
 - There must be no GROUP BY or HAVING acting on the select list.
 - The list of columns selected must include all those needed to insert a new row.
 - The list of columns selected cannot be from a constant, expression, or scalar function.

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Direct INSERT

- In order to insert a single row, where all of the columns are populated, the values to be input need to be in the same order as the columns defined in the table:

```
INSERT INTO emp_act_copy
VALUES('100000' , 'ABC' , 10 , 1.4 ,
      '2003-10-22' , '2003-11-24');
```

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Multi Row INSERT

- If multiple rows are inserted in one statement, and one of them violates a unique index check, all of the rows are rejected.
- In order to insert multiple rows in one statement, separate the row values using a comma:

```
INSERT INTO emp_act_copy VALUES  
( '200000' , 'ABC' , 10 , 1.4 , '2003-10-22' , '2003-11-24' )  
, ( '200000' , 'DEF' , 10 , 1.4 , '2003-10-22' , '2003-11-24' )  
, ( '200000' , 'IJK' , 10 , 1.4 , '2003-10-22' , '2003-11-24' );
```

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NULL and DEFAULT

- The NULL and DEFAULT keywords can be used to assign these values to columns.
- It is also possible to refer to special registers, such as the current date and current time:

```
INSERT INTO emp_act_copy VALUES  
( '400000' , 'ABC' , 10 , NULL , DEFAULT ,  
CURRENT DATE );
```

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Explicitly Listing Columns

- In order to leave some columns out of the insert statement, the columns to be included need to be explicitly listed.
- When this is done, the columns can be referred to in any order:

```
INSERT INTO emp_act_copy
(projno, emendate, actno, empno)
VALUES ('ABC' ,DATE(CURRENT
TIMESTAMP) ,123 ,'500000');
```

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INSERT from SELECT

- The following code snippet will insert a set of rows which are the result of a query INSERT INTO emp_act_copy.

```
SELECT LTRIM(CHAR(id + 600000))
,SUBSTR(UCASE(name),1,6)
,salary / 229
,123
,CURRENT DATE
,'2003-11-11'
FROM staff
WHERE id < 50;
```

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Duplicates

- A reason for tables always having unique indexes is to prevent poorly coded SQL statements which would double the number of rows in the table.
- Example:

```
INSERT INTO emp_act_copy  
SELECT * FROM emp_act_copy;
```

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INSERT Defaults

- In each case, for every row which has been inserted, a value must be provided for any column that does not have a default value.
- For a column that meets one of the following conditions, DEFAULT can be specified which instructs DB2 to insert the default value for that column:
 - Is nullable.
 - Is defined with a default value.
 - Has data type ROWID.
 - ROWID columns always have default values.
 - Is an identity column.
 - Identity columns always have default values.

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Inserting a Single Row

- The VALUES clause of the INSERT statement can be used for inserting a single row of column values into a table.
 - Either all of the columns can be named for which values are being provided or the list of column names can be omitted.
 - If the column name list is provided, values must be specified for all of the columns.

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Inserting a Single Row

- For static INSERT statements, name all of the columns for which values are being provided.
- This is done for the following reasons:
 - The INSERT statement is independent of the table format.
 - It is not necessary to change the statement when a column is added to the table.
 - Verification can be performed on the order of the values.
 - Source statements are more self-descriptive.

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Inserting from Another Table

- Data can be copied from one table into another table.
- A fullselect can be used within an INSERT statement in order to select rows from one table for insertion into another table.

```
INSERT INTO TELE
SELECT LASTNAME, FIRSTNME, PHONENO
FROM EMP
WHERE WORKDEPT = 'D21';
```

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Inserting Data into a ROWID Column

- A ROWID column is a column that is defined with a ROWID data type.
 - It is a requirement to have a column with a ROWID data type in a table that contains a LOB column.
- The ROWID column is stored in the base table and is used to look up the actual LOB data in the LOB table space.
- A ROWID column provides the capability for writing queries which navigate directly to a row in a table.

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ROWID Column

- Prior to inserting data into a ROWID column, it is necessary to know how the ROWID column is defined.
- ROWID columns can be defined as **GENERATED ALWAYS** or **GENERATED BY DEFAULT**.
 - **GENERATED ALWAYS** means that DB2 generates a value for the column, and data can not be inserted into that column.
 - If the column is defined as **GENERATED BY DEFAULT**, a value can be inserted.
 - DB2 provides a default value if it has not been supplied.

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ROWID Column

- Consider an environment in which tables T1 and T2 have two columns:
 - integer column
 - ROWID column
- For the following statement to run successfully, ROWIDCOL2 must be defined as **GENERATED BY DEFAULT**.

```
INSERT INTO T2 (INTCOL2,ROWIDCOL2)
SELECT * FROM T1;
```

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DEFAULT in VALUES

- The DEFAULT keyword in the VALUES clause of an INSERT statement is very practical when inserting with dynamic SQL.
 - All the columns that the user does not provide a value for, can be inserted using DEFAULT.
- If there has not been a specification in the table definition, the default value to be utilized are the values which have been defined on the table or the system default for each data type.
 - The column must be defined with WITH DEFAULT.

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DEFAULT Keyword: Inserting With

Example:

```
INSERT INTO ITEMS
VALUES (440
,'HAMMER'
,50
,1.25
,DEFAULT) ;
```

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Inserting Using Expressions

- Any expression can be specified in the list of values of an INSERT statement.
 - This can be useful with user defined functions, cast functions on user-defined distinct data types, values based on arithmetic, and new datetime functions.

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Inserting with Self-referencing SELECT

- Prior to DB2 V6, in order to INSERT rows into a table, based on a selection of rows from that same table, it was a requirement to have had implemented views on that table.
 - This was necessary in order to provide DB2 with sufficient information regarding the fact that two different tables were being used in the statement.
 - It no longer is needed.
- The fullselect that is specified in the INSERT statement can now be a SELECT from the same table that returns more than a single row.
- This is a practical way for creating more rows based on the rows that already are in the table.
- Values can be varied with arithmetic expressions as well as with functions.

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FETCH FIRST n ROWS ONLY

- DB2 has a FETCH FIRST n ROWS ONLY clause, which provides the capability for specifying a limit on the number of rows returned into the result set.
 - This can be used in an INSERT to select rows.

Example:

```
SELECT T1.CREATOR,T1.NAME
  FROM SYSIBM.SYSTABLES T1
 WHERE T1.CREATOR = 'SYSIBM'
       AND T1.NAME LIKE 'SYS%'
 ORDER BY T1.CREATOR ,T1.NAME
 FETCH FIRST 5 ROWS ONLY;
```

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UPDATE

- The UPDATE statement is used to change one or more columns/rows in a table, view, or fullselect.
- Each column that is to be updated has to be specified.

Example:

```
UPDATE emp_act_copy
SET emptime = NULL
  ,emendate = DEFAULT
  ,emstdate = CURRENT DATE + 2 DAYS
  ,actno = ACTNO / 2
  ,projno = 'ABC'
WHERE empno = '100000';
```

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DELETE Usage

- Rows can be updated in a table, view, or fullselect.
 - If the object is not a table, then it must be updateable.
 - The correlation name is optional, and is only needed when there is an expression or predicate that references another table.
- The SET statement lists the columns to be updated, and the new values that will be received.
- Predicates are optional.
 - If none are provided, all rows in the table are updated.
 - Typically all matching rows are updated.

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Mass UPDATE

- In order to update all rows in a table, all predicates need to be left off:

Example:

```
UPDATE emp_act_copy  
SET actno = actno / 2;
```

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Two Columns Get Same Value

- In the code snippet, both target columns get the same values.
 - This occurs because the result for both columns is calculated before the first column is updated.

Example:

```
UPDATE emp_act_copy ac1
SET actno = actno * 2
,emptime = actno * 2
WHERE empno LIKE '910%';
```

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UPDATE Using SELECT

- It is also possible to have an update refer to the output of a select statement; as long as the result of the select is a single row.

Example:

```
UPDATE emp_act_copy
SET actno = (SELECT MAX(salary) / 10
            FROM staff)
WHERE empno = '200000';
```

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Multi-row UPDATE Using SELECT

- The following code updates multiple columns using a single select.

Example:

```
UPDATE emp_act_copy
SET (actno
    ,emstdate
    ,projno) = (SELECT MAX(salary) / 10
    ,CURRENT DATE + 2 DAYS
    ,MIN(CHAR(id))
FROM staff
WHERE id <> 33)
WHERE empno LIKE '600%';
```

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DELETE

- The DELETE statement is used to remove rows from a table, view, or fullselect.
 - The set of rows deleted depends on the scope of the predicates used.
- This code snippet deletes a single row from the EMP_ACT sample table.

Example:

```
DELETE FROM emp_act_copy
WHERE empno = '000010'
AND projno = 'MA2100'
AND actno = 10;
```

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DELETE

- Predicates are optional.
 - If none are provided, all rows are deleted.
 - Typically all matching rows are deleted.

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Correlated DELETE

Example 1:

```
DELETE FROM staff s1
WHERE id NOT IN
  (SELECT MAX(id)
   FROM staff s2
   WHERE s1.dept = s2.dept);
```

- This code snippet deletes all the rows in the STAFF table; except those ID's which have the highest ID in their respective department.

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Correlated DELETE

Example 2:

```
DELETE FROM staff s1
WHERE EXISTS
  (SELECT *
   FROM staff s2
   WHERE s2.dept = s1.dept
   AND s2.id > s1.id);
```

- This code snippet provides an alternative way for realizing the identical output.