

SQL language: basics

Update commands

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Update commands

- Introduction
- The INSERT command
- The DELETE command
- The UPDATE command

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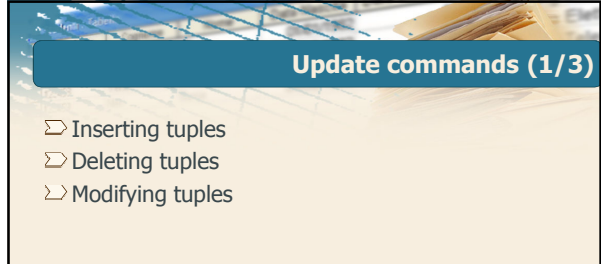
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Update commands

Introduction

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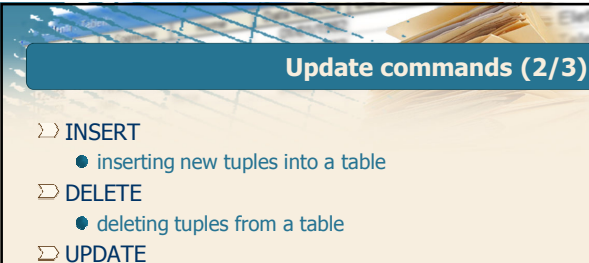


Update commands (1/3)

- Inserting tuples
- Deleting tuples
- Modifying tuples

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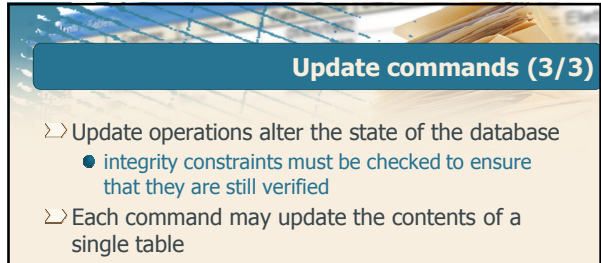


Update commands (2/3)

- INSERT
 - inserting new tuples into a table
- DELETE
 - deleting tuples from a table
- UPDATE
 - modifying the content of tuples in a table

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Update commands (3/3)

- Update operations alter the state of the database
 - integrity constraints must be checked to ensure that they are still verified
- Each command may update the contents of a single table

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Update commands

The INSERT command

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The INSERT command

- Inserting a single tuple
 - assignment of a constant value to each attribute
- Inserting multiple tuples
 - read from other tables by means of a SELECT command

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Inserting a tuple

```
INSERT INTO TableName
      [(ColumnList)]
VALUES (ConstantList);
```

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Inserting a tuple: example (no.1)

- Insert product P7 with Name: Jumper, Color: Purple, Size: 40, Store: Helsinki

```
INSERT INTO P (PId, PName, Color, Size, Store)
VALUES ('P7', 'Jumper', 'Purple', 40, 'Helsinki');
```

- A new tuple is inserted into table P with the specified values

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Inserting a tuple: example (no.1)

- Insert product P7 with Name: Jumper, Color: Purple, Size: 40, Store: Helsinki

```
INSERT INTO P (PId, PName, Color, Size, Store)
VALUES ('P7', 'Jumper', 'Purple', 40, 'Helsinki');
```

- Omitting the field list is equivalent to specifying all fields, according to the column order specified upon table creation
 - If the table schema changes, the INSERT command is no longer valid

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Inserting a tuple: example (no.2)

- Insert product P8 with Store: Istanbul, Size: 42

```
INSERT INTO P (PId, Store, Size)
VALUES ('P8', 'Istanbul', 42);
```

- A new tuple is inserted into table P with the specified values
 - PName and Color are assigned the NULL value
- For all attributes whose values is not specified, the domain of the attribute must allow the NULL value

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Referential integrity with insertions

- ⇒ Insert a new supply for supplier S20, product P20 and quantity 1000

```
INSERT INTO SP (SId, PId, Qty)
VALUES ('S20', 'P20', 1000);
```

- ⇒ Referential integrity constraint
 - P20 and S20 must already be present in the P and S tables respectively
 - if the constraint is not satisfied, the insertion should not be executed



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Inserting multiple records

```
INSERT INTO TableName
[(ColumnList)]
Query;
```

- ⇒ All tuples selected by query *Query* are inserted into table *TableName*
- ⇒ *Query* is an arbitrary SELECT statement
 - it may not include an ORDER BY clause



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Inserting multiple records: example

TOTAL-SUPPLIES (PId, TotalQty)

- ⇒ For each product, insert the overall supplied quantity into table TOTAL-SUPPLIES
 - aggregate data extracted from table SP

```
SELECT PId, SUM(Qty)
FROM SP
GROUP BY PId
```



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Inserting multiple records: example

TOTAL-SUPPLIES (PId, TotalQty)

- ⇒ For each product, insert the overall supplied quantity into table TOTAL-SUPPLIES

```
INSERT INTO TOTAL-SUPPLIES (PId, TotalQty)
(SELECT PId, SUM(Qty)
FROM SP
GROUP BY PId);
```



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Update commands

The DELETE command



The DELETE command

```
DELETE FROM TableName
[WHERE predicate];
```

- ⇒ Deletion of all tuples satisfying the predicate from table *TableName*
- ⇒ It must be ensured that the deletion does not cause the violation of referential integrity constraints



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The DELETE command: example (no.1)

- Delete all supplies

```
DELETE FROM SP;
```

- If no WHERE clause is specified, all tuples satisfy the selection predicate
 - the contents of table SP are deleted
 - the table itself is *not* deleted



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The DELETE command: example (no.2)

- Delete the tuple corresponding to the supplier with code S1

```
DELETE FROM S
WHERE Sid='S1';
```

- If SP includes supplies related to the deleted suppliers, the database loses its integrity
 - a violation of the referential integrity constraint between SP and S occurs
 - the deletion must be propagated



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The DELETE command: example (no.2)

- Delete the tuple corresponding to the supplier with code S1

```
DELETE FROM S
WHERE Sid='S1';
```

```
DELETE FROM SP
WHERE Sid='S1';
```

- To maintain consistency, the deletion operations must be completed on both tables



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The DELETE command: a complex example

- Delete the suppliers based in Paris

```
DELETE FROM S
WHERE City='Paris';
```

- If SP includes supplies referring to the deleted suppliers, the referential integrity constraint between SP and S is violated
 - such supplies must also be deleted from SP



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The DELETE command: a complex example

- Delete the suppliers based in Paris

```
DELETE FROM S
WHERE City='Paris';
```

```
DELETE FROM SP
WHERE Sid IN (SELECT Sid
              FROM S
              WHERE City='Paris');
```

- In which order should the two deletion operations be executed?



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The DELETE command: a complex example


- Correct order of execution

```
DELETE FROM SP
WHERE Sid IN (SELECT Sid
              FROM S
              WHERE City='Paris');
```

```
DELETE FROM S
WHERE City='Paris';
```





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Update commands



The UPDATE command

The UPDATE command

```
UPDATE TableName
SET column = expression
  { column=expression }
[WHERE predicate];
```

- ⇒ All records in table *TableName* satisfying the predicate are modified according to the assignments *column=expression* in the SET clause




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Updating a tuple

- ⇒ Update the features of product P1: assign Yellow to Color, increase the size by 2 and assign NULL to Store

```
UPDATE P
SET Color = 'Yellow',
    Size=Size+2,
    Store = NULL
WHERE PId='P1';
```

- ⇒ The tuple identified by code P1 is updated


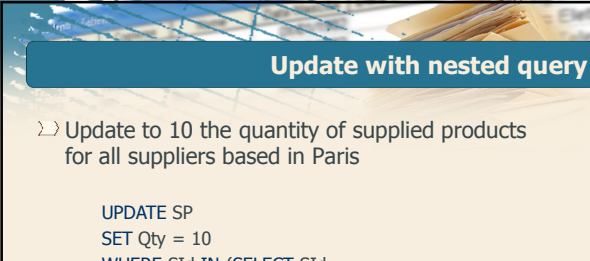

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Multiple updates

- ⇒ Update all suppliers based in Paris by doubling the number of employees

```
UPDATE S
SET #Employees=2*#Employees
WHERE City='Paris';
```


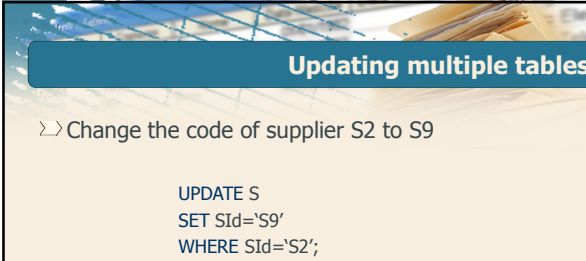
- ⇒ All tuples selected by the predicate in the WHERE clause are updated


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Update with nested query

- ⇒ Update to 10 the quantity of supplied products for all suppliers based in Paris

```
UPDATE SP
SET Qty = 10
WHERE SId IN (SELECT SId
              FROM S
              WHERE City='Paris');
```



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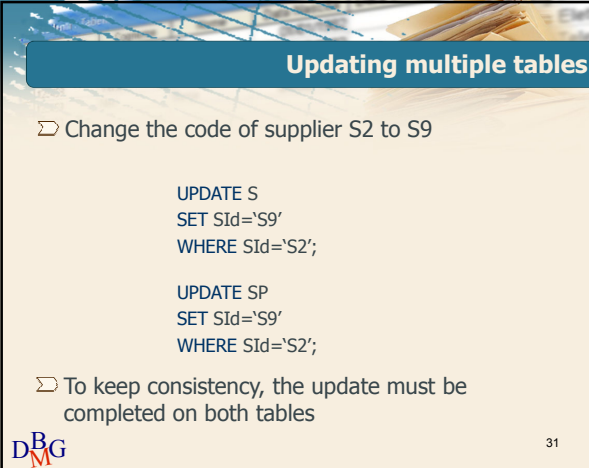
Updating multiple tables

- ⇒ Change the code of supplier S2 to S9

```
UPDATE S
SET SId='S9'
WHERE SId='S2';
```

- ⇒ If SP includes supplies related to the updated suppliers, the referential integrity constraint is violated
 - such supplies must also be updated in SP


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Updating multiple tables

⇒ Change the code of supplier S2 to S9

```
UPDATE S
SET SId='S9'
WHERE SId='S2';

UPDATE SP
SET SId='S9'
WHERE SId='S2';
```

⇒ To keep consistency, the update must be completed on both tables

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