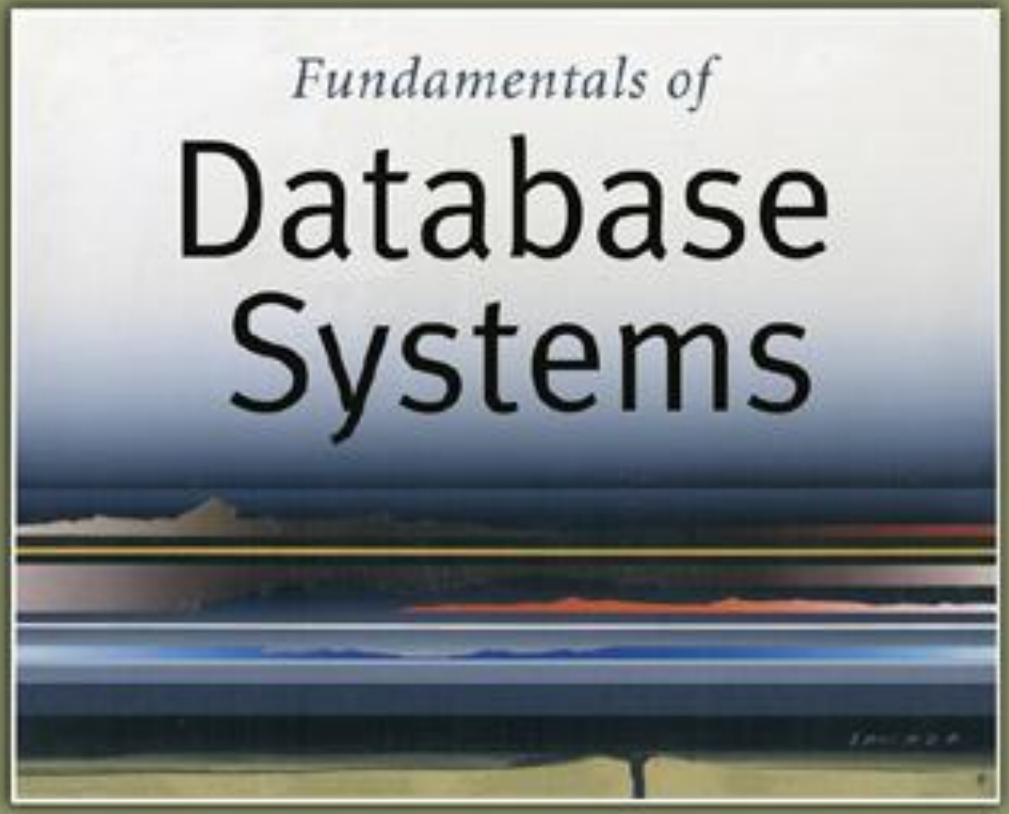
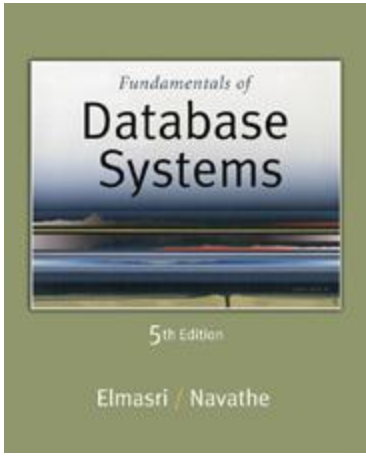


7th Edition

Elmasri / Navathe

Lecture 7

SQL : Schema Definition, Constraints, and Queries and Views



Specifying Updates in SQL

- There are three SQL commands to modify the database: **INSERT**, **DELETE**, and **UPDATE**

INSERT

- In its simplest form, it is used to add one or more tuples to a relation
- Attribute values should be listed in the same order as the attributes were specified in the **CREATE TABLE** command

INSERT (contd.)

- Example:

  U1: INSERT INTO EMPLOYEE
  VALUES (”Richard“,'K',“Marini“, ”653298653“, ”30-DEC-52“,“98 Oak Forest,Katy,TX“, 'M', 37000,“987654321“, 4)

- An alternate form of INSERT specifies explicitly the attribute names that correspond to the values in the new tuple
  - Attributes with NULL values can be left out
- Example: Insert a tuple for a new EMPLOYEE for whom we only know the FNAME, LNAME, and SSN attributes.

  U1A: INSERT INTO EMPLOYEE (FNAME, LNAME, SSN)
  VALUES (”Richard“, ”Marini“, ”653298653“)

INSERT (contd.)

- Important Note: Only the constraints specified in the DDL commands are automatically enforced by the DBMS when updates are applied to the database
  - Another variation of INSERT allows insertion of *multiple tuples* resulting from a query into a relation

INSERT (contd.)

- Example: Suppose we want to create a temporary table that has the name, number of employees, and total salaries for each department.
  - A table DEPTS_INFO is created by U3A, and is loaded with the summary information retrieved from the database by the query in U3B.

```
U3A:    CREATE TABLE  DEPTS_INFO
                (DEPT_NAME          VARCHAR(10),
                 NO_OF_EMPS         INTEGER,
                 TOTAL_SAL          INTEGER);

U3B:    INSERT INTO   DEPTS_INFO (DEPT_NAME,
                      NO_OF_EMPS, TOTAL_SAL)
                SELECT      DNAME, COUNT (*), SUM (SALARY)
                FROM        DEPARTMENT, EMPLOYEE
                WHERE       DNUMBER=DNO
                GROUP BY    DNAME ;
```

INSERT (contd.)

- Note: The DEPTS_INFO table may not be up-to-date if we change the tuples in either the DEPARTMENT or the EMPLOYEE relations *after* issuing U3B. We have to create a view (see later) to keep such a table up to date.

DELETE

- Removes tuples from a relation
  - Includes a WHERE-clause to select the tuples to be deleted
  - Referential integrity should be enforced
  - Tuples are deleted from only *one table* at a time (unless CASCADE is specified on a referential integrity constraint)
  - A missing WHERE-clause specifies that *all tuples* in the relation are to be deleted; the table then becomes an empty table
  - The number of tuples deleted depends on the number of tuples in the relation that satisfy the WHERE-clause

DELETE (contd.)

- Examples:

U4A:
```
DELETE FROM EMPLOYEE
WHERE LNAME=”Brown“
```

U4B:
```
DELETE FROM EMPLOYEE
WHERE SSN=”123456789“
```

U4C:
```
DELETE FROM EMPLOYEE
WHERE DNO IN
(SELECT DNUMBER
FROM DEPARTMENT
WHERE
DNAME=”Research“)
```

U4D:
```
DELETE FROM EMPLOYEE
```

UPDATE

- Used to modify attribute values of one or more selected tuples
- A WHERE-clause selects the tuples to be modified
- An additional SET-clause specifies the attributes to be modified and their new values
- Each command modifies tuples *in the same relation*
- Referential integrity should be enforced

UPDATE (contd.)

- Example: Change the location and controlling department number of project number 10 to 'Bellaire' and 5, respectively.

```
U5:     UPDATE    PROJECT
        SET       PLOCATION = ”Bellaire“,
                            DNUM = 5
        WHERE     PNUMBER=10
```

UPDATE (contd.)

- Example: Give all employees in the 'Research' department a 10% raise in salary.

```
U6: UPDATE    EMPLOYEE
    SET       SALARY = SALARY *1.1
    WHERE     DNO  IN (SELECT    DNUMBER
                  FROM       DEPARTMENT
                  WHERE      DNAME=”Research“)
```

- In this request, the modified SALARY value depends on the original SALARY value in each tuple
  - The reference to the SALARY attribute on the right of = refers to the old SALARY value before modification
  - The reference to the SALARY attribute on the left of = refers to the new SALARY value after modification

Views in SQL

- A view is a “virtual” table that is derived from other tables
- Allows for limited update operations
  - Since the table may not physically be stored
- Allows full query operations
- A convenience for expressing certain operations

Specification of Views

- SQL command: **`CREATE VIEW`**
  - a table (view) name
  - a possible list of attribute names (for example, when arithmetic operations are specified or when we want the names to be different from the attributes in the base relations)
  - a query to specify the table contents

SQL Views: An Example

- Specify a different WORKS_ON table

```
CREATE VIEW WORKS_ON_NEW AS
SELECT FNAME, LNAME, PNAME, HOURS
    FROM EMPLOYEE, PROJECT, WORKS_ON
    WHERE SSN=ESSN AND PNO=PNUMBER
    GROUP BY PNAME;
```

Using a Virtual Table

- We can specify SQL queries on a newly create table (view):

```
SELECT FNAME, LNAME
    FROM WORKS_ON_NEW
    WHERE PNAME="Seena";
```

- When no longer needed, a view can be dropped:

```
DROP WORKS_ON_NEW;
```

Efficient View Implementation

- Query modification:
  - Present the view query in terms of a query on the underlying base tables
- Disadvantage:
  - Inefficient for views defined via complex queries
    - Especially if additional queries are to be applied to the view within a short time period

Update Views

- Update on a single view without aggregate operations:
  - Update may map to an update on the underlying base table
- Views involving joins:
  - An update *may* map to an update on the underlying base relations
    - Not always possible

Un-updatable Views

- Views defined using groups and aggregate functions are not updateable
- Views defined on multiple tables using joins are generally not updateable
- **`WITH CHECK OPTION`**: must be added to the definition of a view if the view is to be updated
  - To allow check for updatability and to plan for an execution strategy