

# **DATA AND SCHEMA MODIFICATIONS**

**CHAPTERS 4,5 (6/E)**

**CHAPTER 8 (5/E)**

# LECTURE OUTLINE

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- Updating Databases Using SQL
- Schema Change Statements in SQL

# THE INSERT COMMAND

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- Adds tuple(s) to a relation
- Needs relation name and a list of values for the tuple(s)
  - Union-compatible
  - Two options for specifying values:
    - Explicit list
    - Result from a `SELECT` statement

```
U1:  INSERT INTO  EMPLOYEE
      VALUES      ( 'Richard', 'K', 'Marini', '653298653', '1962-12-30', '98
                    Oak Forest, Katy, TX', 'M', 37000, '653298653', 4 );
```

```
U3B:  INSERT INTO  WORKS_ON_INFO ( Emp_name, Proj_name,
                                     Hours_per_week )
      SELECT        E.Lname, P.Pname, W.Hours
      FROM          PROJECT P, WORKS_ON W, EMPLOYEE E
      WHERE         P.Pnumber=W.Pno AND W.Essn=E.Ssn;
```

# THE DELETE COMMAND

---

- Removes tuple(s) from a relation
- Needs relation name and (optionally) a `WHERE` clause to select tuple(s) to be deleted

|             |                    |                         |
|-------------|--------------------|-------------------------|
| <b>U4A:</b> | <b>DELETE FROM</b> | <b>EMPLOYEE</b>         |
|             | <b>WHERE</b>       | <b>Lname='Brown';</b>   |
| <b>U4B:</b> | <b>DELETE FROM</b> | <b>EMPLOYEE</b>         |
|             | <b>WHERE</b>       | <b>Ssn='123456789';</b> |
| <b>U4C:</b> | <b>DELETE FROM</b> | <b>EMPLOYEE</b>         |
|             | <b>WHERE</b>       | <b>Dno=5;</b>           |
| <b>U4D:</b> | <b>DELETE FROM</b> | <b>EMPLOYEE;</b>        |

- `WHERE` clause can be arbitrarily complex (like for `SELECT`), including the use of nested `SELECT` statements

# THE UPDATE COMMAND

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- Modifies column value(s) in one or more selected tuples
- Needs relation name, column(s) to be modified and new values, and (optionally) `WHERE` clause to select tuple(s) to be modified
  - Required **SET** clause in the `UPDATE` command

```
U5:      UPDATE      PROJECT
          SET          Plocation = 'Bellaire', Dnum = 5
          WHERE        Pnumber=10;
```

- May use old value(s) and relations to determine new value(s)

```
UPDATE Employee
SET      Salary = Salary*1.03
WHERE    Dno IN ( SELECT Dnumber
                  FROM Department
                  WHERE Dname LIKE '%Research%') ;
```

# UPDATES MIGHT FAIL

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- Recall: constraints specified in schema declaration
  1. Inserted tuples might violate ...
    - domain constraints,
    - uniqueness constraints,
    - referential constraints, or
    - check constraints
      - Recall: `CHECK (Dept_create_date <= Mgr_start_date)`
  2. Deleted tuples might violate referential constraints

(Why not domain, uniqueness, or check constraints?)

    - Instead of failing, might cause cascaded deletes (recall: `ON DELETE CASCADE`)
  3. Modifications might fail (or cascade) like deletions or insertions

# SCHEMA EVOLUTION COMMANDS

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- Revise schema declaration as business needs evolve
  - Change set of tables
  - Change attributes within tables
  - Change set of constraints
- Part of DDL rather than DML
  - Contrast to database update commands
- Can be done while the database is operational

# THE DROP COMMAND

---

- Drops named schema elements (e.g., tables, domains, constraints)
- Drop behavior options:
  - CASCADE and RESTRICT
  - Latter means no ripple-on effects allowed

- Example:

```
DROP SCHEMA Company CASCADE;
```

- Causes tables, domains, and constraints in schema to be dropped as well
- With RESTRICT, command would succeed only if schema is empty



# THE ALTER COMMAND

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- Can add a column to a table

```
ALTER TABLE Company.Employee  
    ADD COLUMN Job VARCHAR(12);
```

- Can drop a column

- Choose either CASCADE or RESTRICT
- CASCADE permits constraints on columns to be dropped automatically

- Can alter a column definition

- Change type, NULL-ability, or default value

- Can add or drop a named table constraint

```
ALTER TABLE Company.Employee  
    DROP CONSTRAINT EmpSuperFK;
```

# LECTURE SUMMARY

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- Database modification commands
- Schema modification commands