Action Statements

- INSERT
- DELETE
- UPDATE
Insert

Individual Insert

```
INSERT INTO student
VALUES ( 'Patel', 'Deepa', 14662, null,
        'GRD', 'COMP-SCI', 'Evanston', 2003 );
```

Multiple Insert

```
INSERT INTO student
SELECT * FROM ...

INSERT INTO student
SELECT * FROM mschaefer.student;
```
Insert Partial Record

INSERT INTO student(LastName, FirstName, SID) VALUES ( 'Patel', 'Deepa', 14662);

Effects:
- not null constraints
- default values
Insert Partial Full Record

Even if all values are present:

```
INSERT INTO student(LastName, FirstName, SID, SSN, Career, Program, City, Started)
VALUES ( 'Patel', 'Deepa', 14662, null, 'GRD', 'COMP-SCI', 'Evanston', 2003 );
```

Why?
Delete

Selective deletion

DELETE FROM table
WHERE condition;

Delete all records in table

DELETE FROM table;
Update

UPDATE table
SET attribute = value, attribute = value ...
WHERE condition

Example:

UPDATE employee
SET salary = salary * (1.05)
WHERE type = 'manager'
Integrity Violations?

What if we insert a record with a duplicate p.k.?

What else can we do wrong with

INSERT, DELETE, UPDATE?
We can specify actions if referential integrity of a foreign key is violated

- SET NULL
- SET DEFAULT
- CASCADE

Specified as

- ON DELETE/UPDATE
  - SET NULL/CASCADE/DEFAULT

Warning: Oracle supports green options directly
Referential Triggered Action II

**Example (CASCADE)**

```sql
CREATE TABLE dependent ( ... 
    FOREIGN KEY (essn) 
    REFERENCES employee(ssn) 
    ON DELETE CASCADE, ...)
```

**Example (SET NULL)**

```sql
CREATE TABLE studentgroup ( 
    FOREIGN KEY (PresidentID) 
    REFERENCES student(SID) 
    ON DELETE SET NULL)
```

**Example (SET DEFAULT)**

```sql
CREATE TABLE employee ( ... 
    dno INT NOT NULL DEFAULT 1, ... 
    FOREIGN KEY (dno) 
    REFERENCES department(dnumber) 
    ON DELETE SET DEFAULT ...)
```
Referential Triggered Action

Find further examples for

- **ON UPDATE CASCADE**
- **ON DELETE CASCADE**
- **ON DELETE SET NULL**
- **ON DELETE SET DEFAULT**

Foreign keys in student database?