**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?

Referential Triggered Action I

We can specify actions if referential integrity of a foreign key is violated

<table>
<thead>
<tr>
<th>SET NULL</th>
<th>SET DEFAULT</th>
<th>CASCADE</th>
</tr>
</thead>
</table>

Specified as

ON DELETE/UPDATE
SET NULL/CASCADE/DEFAULT

Warning: Oracle supports green options directly

Referential Triggered Action II

Example (CASCADE)

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

Example (SET NULL)

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

Example (SET DEFAULT)

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


Referential Triggered Action

III

Find further examples for
ON UPDATE CASCADE
ON DELETE CASCADE
ON DELETE SET NULL
ON DELETE SET DEFAULT

Foreign keys in student database?