Possible foreign key violation actions :

Department Table

* insert
* update

default action : RESTRICT – not allowed ; error msg

Employee Table : primary key SSN

* delete
* update

Possible actions :

1. RESTRICT (default)
2. SET NULL
3. CASCADE

```
CREATE TABLE Department
   :
   mgrSSN

FOREIGN KEY (mgrSSN) REFERENCES Emp (SSN)
                    ON DELETE SET NULL
                    ON UPDATE CASCADE;
   :
```

Example :

R (a, b)

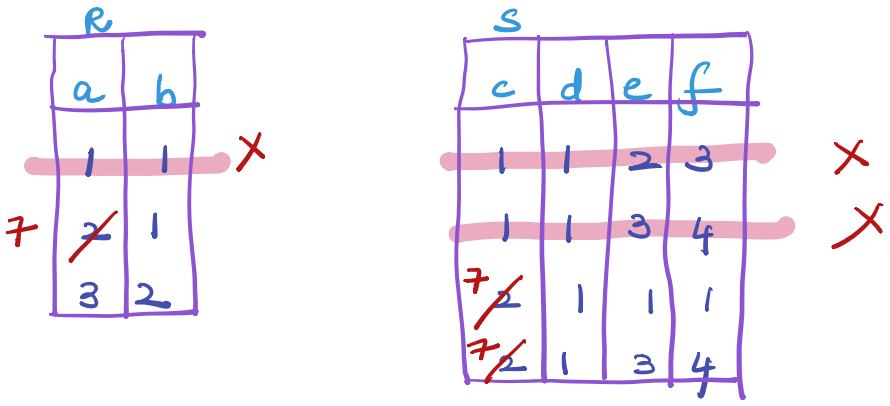
S (c, d, e, f)

↓

foreign key (c,d) references primary key R(a,b)

on delete cascade

on update cascade



Example :

Which of the following is guaranteed to not cause an error ?

R (a, b)

S (c, d, e)

foreign key d references a

1) insert into R ✓
2) insert into S ✗
3) delete from S ✓
4) update R ✗

* To add a constraint after the table is created:

```
ALTER Table Dependent
constraint DepSSN
ADD foreign key (essn) References Employee (SSN)
 on update cascade
 on delete cascade;
```

```
update Emp set SSN = 1233 where SSN = 1234;
delete from EMP where SSN = 1233;
```

* To show unnamed constraints:

```
SHOW CREATE TABLE DEPENDENT;
```

* To delete a constraint:

```
DROP constraint DEPSSN;
```

Attribute based constraints: not available in mysql

```
CREATE table DEPARTMENT (
    DNO INT NOTNULL;
    constraint dnoc
      CHECK (DNO > 0 AND DNO < 10);
```

checked whenever dno is affected

Tuple based constraints:

* If more than one attribute

```
CREATE Table WORKS-ON (
    ESSN
     :
    CHECK ( hours > 20 OR pno = 1 );
     :
```

Interrelation constraints :

```
CREATE Table DEPARTMENT (
     :
    CHECK (mgrSSN IN ( select SSN from EMPLOYEE
                       where Dno = Dnumber ))
```

TRIGGERS Chapter 26.1

* fired (executed) when an event occurs in the database.
  - event → insert, delete, update

  check the trigger condition over the database; if true ACTION.

* implemented in SCHEMA

CREATE trigger <name> → user defined name

BEFORE / AFTER <event>

ON TABLE <T> → insert T, update T, delete T

FOR EACH ROW

WHEN <condition> → not in MySQL

<action>

→ SQL statements

Example foreign key constraint : cascaded delete

dependent . essn to Emp. ssn

```
CREATE trigger depFK
 AFTER delete on EMPLOYEE
 for each row
   Delete from DEPENDENT
   where essn = old.ssn
```

↓

refers to the tuple that was just selected for delete from EMP.

```
Delete from EMP where SSN = 1234;
```

Example 2

```
CREATE trigger DepUpdate
 AFTER DELETE on EMPLOYEE
```

```
for each row
    update DEPENDENT
    set ESSN = '9876'
    where ESSN = old.SSN;
```

Example 3: