

# COMPSCI 351

## Fundamentals of Database Systems

Strategic Exercise 2 - Model answers

SQL

### Exercise 1.

Consider the following relational database schema

- SUPPLIERS={sid,sname,address} with key {sid},

```
CREATE TABLE SUPPLIERS(  
    sid number(10) PRIMARY KEY,  
    sname varchar(40) NOT NULL,  
    address varchar(60) NOT NULL);
```

- PARTS={pid, pname, color} with key {pid},

```
CREATE TABLE PARTS(  
    pid number(15) PRIMARY KEY,  
    pname varchar(30) NOT NULL,  
    color varchar(15) NOT NULL);
```

- CATALOG={sid,pid,cost} with key {sid,pid} and foreign keys
  - [sid]  $\subseteq$  SUPPLIERS[sid] and
  - [pid]  $\subseteq$  PARTS[pid]

```
CREATE TABLE CATALOG(  
    sid number(10),  
    pid number(15),  
    cost real NOT NULL,  
    PRIMARY KEY (sid, pid),  
    FOREIGN KEY sid REFERENCES SUPPLIERS,  
    FOREIGN KEY pid REFERENCES PARTS);
```

Define this database schema in SQL, as close as possible.

### Exercise 2.

Consider the SQL database schema from the previous exercise. Write down the following queries in SQL.

- a. Find the *pnames* of parts for which there is some supplier.

```
SELECT DISTINCT P.pname
FROM PARTS P, CATALOG C
WHERE P.pid = C.pid ;
```

- b. Find the *snames* of suppliers who supply every part.

```
SELECT S.sname
FROM SUPPLIERS S
WHERE NOT EXISTS (( SELECT P.pid
                     FROM PARTS P )
                  EXCEPT
                  ( SELECT C.pid
                    FROM CATALOG C
                    WHERE C.sid = S.sid ));
```

- c. Find the *snames* of suppliers who supply every red part.

```
SELECT S.sname
FROM SUPPLIERS S
WHERE NOT EXISTS (( SELECT P.pid
                     FROM PARTS P
                     WHERE P.color = 'red' )
                  EXCEPT
                  ( SELECT C.pid
                    FROM CATALOG C
                    WHERE C.sid = S.sid));
```

- d. Find the *pnames* of parts supplied by Acme Widget Suppliers and no one else.

```
SELECT P.pname
FROM PARTS P, CATALOG C, SUPPLIERS S
WHERE P.pid = C.pid AND C.sid = S.sid
   AND S.sname = 'Acme Widget Suppliers'
   AND NOT EXISTS ( SELECT *
                    FROM CATALOG C1, SUPPLIERS S1
                    WHERE P.pid = C1.pid AND C1.sid = S1.sid AND
                          S1.sname <> 'Acme Widget Suppliers' );
```

- e. Find the *sids* of suppliers who charge more for some part than the average cost of that part (averaged over all the suppliers who supply that part).

```
SELECT DISTINCT C.sid
FROM CATALOG C
WHERE C.cost > ( SELECT AVG (C1.cost)
                 FROM CATALOG C1
                 WHERE C1.pid = C.pid );
```

- f. For each part, find the *sname* of the supplier who charges the most for that part.

```
SELECT P.pid, S.sname
FROM PARTS P, SUPPLIERS S, CATALOG C
WHERE C.pid = P.pid AND
      C.sid = S.sid AND
      C.cost = (SELECT MAX (C1.cost)
                FROM CATALOG C1
                WHERE C1.pid = P.pid);
```

- g. Find the *sids* of suppliers who supply only red parts.

```
SELECT DISTINCT C.sid
FROM CATALOG C
WHERE NOT EXISTS ( SELECT *
                   FROM PARTS P
                   WHERE P.pid = C.pid AND P.color <> 'Red' );
```

- h. Find the *sids* of suppliers who supply a red part and a green part.

```
SELECT DISTINCT C.sid
FROM CATALOG C, PARTS P
WHERE C.pid = P.pid AND P.color = 'Red'
INTERSECT
SELECT DISTINCT C1.sid
FROM CATALOG C1, PARTS P1
WHERE C1.pid = P1.pid AND P1.color = 'Green' ;
```

- i. Find the *sids* of suppliers who supply a red part or a green part.

```
SELECT DISTINCT C.sid
FROM CATALOG C, PARTS P
WHERE C.pid = P.pid AND P.color = 'Red'
UNION
SELECT DISTINCT C1.sid
FROM CATALOG C1, PARTS P1
WHERE C1.pid = P1.pid AND P1.color = 'Green' ;
```

- j. For every supplier that only supplies green parts, print the name of the supplier and the total number of parts that she supplies.

```
SELECT S.sid, S.sname, COUNT(*) as PartCount
FROM SUPPLIERS S, PARTS P, CATALOG C
WHERE P.pid = C.pid AND C.sid = S.sid
GROUP BY S.sname, S.sid
HAVING EVERY (P.color='Green') ;
```

- k. For every supplier that supplies a green part and a red part, print the name and price of the most expensive part that she supplies.

```
SELECT S.sid, S.sname, MAX(C.cost) as MaxCost
FROM SUPPLIERS S, PARTS P, CATALOG C
WHERE P.pid = C.pid AND C.sid = S.sid
GROUP BY S.sid, S.sname
HAVING ANY ( P.color='green' ) AND ANY ( P.color = 'red' );
```