Databases
DBDMG - Politecnico di Torino
SQL I: Solutions

Exercise 1. Given the relational schema including the following tables (primary keys are underlined):

MAGAZINE (MId, MName, Publisher)
ARTICLE (AId, Title, Topic, MId)

express the following queries in SQL language:

(a) Find the names of the magazines that have published at least one article about motorcycles.

```
SELECT M.MId, MName
FROM MAGAZINE M, ARTICLE A
WHERE M.MId=A.MId
AND Topic='motorcycles';
```

```
SELECT MId, MName
FROM MAGAZINE
WHERE MId IN
   (SELECT MId
    FROM ARTICLE
    WHERE Topic='motorcycles');
```

```
SELECT MId, MName
FROM MAGAZINE M
WHERE EXISTS
   (SELECT *
    FROM ARTICLE A
    WHERE A.MId = M.MId
    AND Topic='motorcycles');
```

(b) Find the names of the magazines that have never published any article about motorcycles.

```
SELECT MId, MName
FROM MAGAZINE
WHERE MId NOT IN
   (SELECT MId
    FROM ARTICLE
    WHERE Topic='motorcycles');
```

```
SELECT MId, MName
FROM MAGAZINE M
WHERE NOT EXISTS
   (SELECT *
    FROM ARTICLE A
    WHERE A.MId = M.MId
    AND Topic='motorcycles');
```

(c) Find the names of the magazines that have only ever published articles about motorcycles.

```
SELECT M.MId, MName
FROM MAGAZINE M, ARTICLE A
WHERE M.MId = A.MId
AND M.MId NOT IN
   (SELECT MId
    FROM ARTICLE
    WHERE Topic <> 'motorcycles');
```

```
SELECT M.MId, MName
FROM MAGAZINE M, ARTICLE A
WHERE M.MId = A.MId
AND NOT EXISTS
   (SELECT *
    FROM ARTICLE A2
    WHERE A2.MId = M.MId
    AND Topic <> 'motorcycles');
```

(d) Find the names of the magazines that publish articles about motorcycles or cars.

```
SELECT M.MId, MName
FROM MAGAZINE M, ARTICLE A
WHERE M.MId=A.MId
AND (Topic='motorcycles' OR Topic='cars');
```

(e) Find the names of the magazines that publish both articles about motorcycles and articles about cars.

```
SELECT M.MId, MName
FROM MAGAZINE M, ARTICLE A
WHERE M.MId=A.MId
AND Topic='motorcycles'
AND M.MId IN
  (SELECT MId
   FROM ARTICLE
   WHERE Topic='cars');
```

```
SELECT MId, MName
FROM MAGAZINE
WHERE MId IN
  (SELECT MId
   FROM ARTICLE
   WHERE Topic='motorcycles')
AND MId IN
  (SELECT MId
   FROM ARTICLE
   WHERE Topic='cars');
```

(f) Find the names of the magazines that have published at least two articles about motorcycles.

```
SELECT M.MId, MName
FROM MAGAZINE M, ARTICLE A
WHERE M.MId=A.MId
AND Topic='motorcycles'
GROUP BY M.MId, MName
HAVING COUNT(*) >= 2;
```

(g) Find the names of the magazines that have published only one article about motorcycles (i.e., they may have published any number of articles about other topics).

```
SELECT M.MId, MName
FROM MAGAZINE M, ARTICLE A
WHERE M.MId=A.MId
AND Topic='motorcycles'
GROUP BY M.MId, MName
HAVING COUNT(*) = 1;
```

Exercise 2. Given the relational schema including the following tables (primary keys are underlined):

```
SAILOR(SId, SName, Expertise, DateOfBirth)
BOOKING(SId, BId, Date)
BOAT(BId, BName, Color)
```

express the following queries in SQL language:

(a) Find the names of the sailors who have booked a red boat or a green boat.

```
SELECT S.SId, SName
FROM SAILOR S, BOOKING BK, BOAT B
WHERE S.SId = BK.SId AND B.BId = BK.BId
AND (Color='red' OR Color='green');
```

```
SELECT SId, SName
FROM SAILOR S
WHERE SId IN
   (SELECT SId
    FROM BOOKING BK, BOAT B
    WHERE B.BId = BK.BId
    AND (Color='red' OR Color='green'));
```


(b) Find the codes and the names of the sailors who have booked a red boat and a green boat.

```
SELECT S.SId, SName
FROM SAILOR S, BOOKING BK, BOAT B
WHERE S.SId = BK.SId AND B.BId = BK.BId
AND Color='red'
AND S.SId IN
   (SELECT SId
    FROM BOOKING BK, BOAT B
    WHERE B.BId = BK.BId
    AND Color='green');
```

```
SELECT SId, SName
FROM SAILOR S
WHERE SId IN
   (SELECT SId
    FROM BOOKING BK, BOAT B
    WHERE B.BId = BK.BId
    AND Color='red')
AND SId IN
   (SELECT SId
    FROM BOOKING BK, BOAT B
    WHERE B.BId = BK.BId
    AND Color='green' );
```

(c) Find the codes of the sailors who have never booked a red boat.

```
SELECT SId
FROM SAILOR S
WHERE SId NOT IN
   (SELECT SId
    FROM BOOKING BK, BOAT B
    WHERE B.BId = BK.BId
    AND Color='red');
```

(d) Find the codes and the names of the sailors who have never booked a red boat.

```
SELECT SId, SName
FROM SAILOR S
WHERE SId NOT IN
   (SELECT SId
    FROM BOOKING BK, BOAT B
    WHERE B.BId = BK.BId
    AND Color='red');
```

```
SELECT SId, SName
FROM SAILOR S
WHERE NOT EXISTS
   (SELECT *
    FROM BOOKING BK, BOAT B
    WHERE B.BId = BK.BId
    AND S.SId = BK.SId
    AND Color='red');
```

(e) Find the codes and the names of the sailors who have booked at least two boats.

```
SELECT S.SId, SName
FROM SAILOR S, BOOKING BK
WHERE S.SId = BK.SId
GROUP BY S.SId, SName
HAVING COUNT(DISTINCT BId) >= 2;
```

```
SELECT SId, SName
FROM SAILOR S
WHERE SId IN
   (SELECT SId
    FROM BOOKING
    GROUP BY SId
    HAVING COUNT(DISTINCT BId) >= 2);
```

(f) Find the codes and the names of the sailors who have booked at least three boats.

```
SELECT S.SId, SName
FROM SAILOR S, BOOKING BK
WHERE S.SId = BK.SId
GROUP BY S.SId, SName
HAVING COUNT(DISTINCT BId) >= 3;
```

```
SELECT SId, SName
FROM SAILOR S
WHERE SId IN
   (SELECT SId
    FROM BOOKING
    GROUP BY SId
    HAVING COUNT(DISTINCT BId) >= 3);
```

Exercise 3. Given the relational schema including the following tables (primary keys are underlined):

```
AIRCRAFT(AId, AName, MaximumRange)
CERTIFICATE(PId, AId)
PILOT(PId, PName, Salary)
```

express the following queries in SQL language:

(a) Find the codes and the names of the pilots who are qualified to fly on an aircraft that can cover distances greater than 5,000 km (`MaximumRange` $\geq$ `5,000`).

```
SELECT P.PId, PName
FROM PILOT P, CERTIFICATE C, AIRCRAFT A
WHERE P.PId = C.PId AND C.AId = A.AId
AND MaximumRange > 5000;
```

```
SELECT PId, PName
FROM PILOT
WHERE PId IN
   (SELECT PId
    FROM CERTIFICATE C, AIRCRAFT A
    WHERE C.AId = A.AId
    AND MaximumRange > 5000);
```

(b) Find the codes and the names of the pilots who are qualified to fly on at least two aircrafts that can cover distances greater than 5,000 km.

```
SELECT P.PId, PName
FROM PILOT P, CERTIFICATE C, AIRCRAFT A
WHERE P.PId = C.PId AND C.AId = A.AId
AND MaximumRange > 5000
GROUP BY P.PId, PName
HAVING COUNT(*) >= 2;
```

```
SELECT PId, PName
FROM PILOT
WHERE PId IN
   (SELECT PId
    FROM CERTIFICATE C, AIRCRAFT A
    WHERE C.AId = A.AId
    AND MaximumRange > 5000
    GROUP BY PId
    HAVING COUNT(*) >= 2);
```

(c) Find the codes and the names of the pilots who are qualified to fly on at least two aircrafts that can cover distances greater than 5,000 km, and who are qualified to fly on a Boeing.

```
SELECT P.PId, PName
FROM PILOT P, CERTIFICATE C, AIRCRAFT A
WHERE P.PId = C.PId AND C.AId = A.AId
AND MaximumRange > 5000
AND PId IN
   (SELECT PId
    FROM CERTIFICATE C, AIRCRAFT A
    WHERE C.AId = A.AId
    AND AName ='Boeing')
GROUP BY P.PId, PName
HAVING COUNT(*) >= 2;
```

```
SELECT PId, PName
FROM PILOT
WHERE PId IN
   (SELECT PId
    FROM CERTIFICATE C, AIRCRAFT A
    WHERE C.AId = A.AId
    AND MaximumRange > 5000
    GROUP BY PId
    HAVING COUNT(*) >= 2)
AND PId IN
   (SELECT PId
    FROM CERTIFICATE C, AIRCRAFT A
    WHERE C.AId = A.AId
    AND AName ='Boeing');
```