

Solution to B561 Assignment 4

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SQL

- We write $r(\underline{A}BC)$ for a relational schema with relation name r and attributes (or fields) A , B , and C . The underlined attribute is the primary key.

Given following relational schema, write SQL queries to answer the following queries.

Relational schema of question 1.

Product(model, maker, type)

PC(model, speed, ram, hd, price)

Laptop(model, speed, ram, hd, screen, price)

Printer(model, color, type, price)

The sample data for relations of question 1. These data are not used to calculate results of following questions.

Product:

<u>model</u>	maker	type
1001	A	PC
3001	B	Printer
2001	C	laptop

PC:

<u>model</u>	speed	ram	hd	price
1001	2.66	1024	250	2114
1002	1.42	512	250	955
1003	3.20	2048	160	1049

Laptop:

<u>model</u>	speed	ram	hd	screen	price
2001	2.00	1024	250	15	2114
2002	1.73	512	80	24	955
2003	1.83	2048	60	20	1049

Printer:

<u>model</u>	color	type	price
3001	true	ink-jet	99
3002	false	laser	239
3003	true	laser	899

1. What PC models have a speed of at least 3.00?

```
select model
from PC
where PC.speed >= 3.00
```
2. Find the model numbers of all color laser printers.

```
select model
from Printer
where type='lazer' and color='true'
```
3. Which manufacturers make laptops with a hard disk of at least 100GB?

```
select DISTINCT P.maker
from Product P, Laptop L
where P.model = L.model and L.hd >= 100
```
4. Find the model number and price of all products (of any type) made by manufacturer B.

```
select PC.model, PC.price
from Product P, PC
where P.maker='B' and P.model = PC.model
union
select L.model, L.price
from Product P, Laptop L
where P.maker='B' and P.model = L.model
union
select PR.model, PR.price
from Product P, Printer PR
where P.maker='B' and P.model = PR.model
```
5. Find those manufacturers that sell Laptops, but not PC's.

```
select DISTINCT maker
from product P
where P.type='Laptop'
EXCEPT
select DISTINCT maker
from product P
where P.type='PC'
```
6. Find those manufacturers that sell all models of PCs and lazer Printers.

```
select DISTINCT P.maker
```

```

from product P
where not exists(( select PC.model
                   from PC)
                 EXCEPT
                 (select P1.model
                  from Product P1
                  where P1.maker=P.maker and P1.type='PC'))
INTERSECT
select DISTINCT P.maker
from product P
where not exists(( select Pr.model
                   from Printer Pr)
                 EXCEPT
                 (select P2.model
                  from Product P2, Printer Pr
                  where Pr.model = P2.model and P2.maker=P.maker
                  and Pr.type='lazer'))

```

7. Find those manufacturers whose laptops have all ram sizes that manufacturer B's laptops have.

```

select DISTINCT P.maker
from Product P
where not exists( (select Lp.ram
                  from Laptop Lp, Product P1
                  where Lp.model = P1.model and P1.maker = 'B')
                 EXCEPT
                 (select Lp1.ram
                  from Laptop Lp1, Product P2
                  where Lp1.model = P2.model and
                  P2.maker=P.maker))

```

8. Find those manufacturers of at least two different computers (PC's or laptops) with speeds of at least 2.80.

```

select DISTINCT P.maker
from Product P, Product P1,
where P.maker = P1.maker
and P.model in (select PC.model
                from PC
                where PC.speed > 2.80
                UNION

```

```

        select LP.model
        from Laptop LP
        where Lp.speed > 2.80
    )
and P1.model in (select PC.model
                from PC
                where PC.speed > 2.80
                UNION
                select LP.model
                from Laptop LP
                where Lp.speed > 2.80)
and P.model <> P1.model

```

9. Find the manufacturers of PC's with at least two different speeds.

```

select DISTINCT P.make
from Product P, Product P1
where P.make=P1.make
and exists(
    select PC.model
    from PC, PC PC1
    where PC.model <>PC1.model
    and PC.speed <> PC1.speed
    and PC.model = P.model
    and PC1.model = P1.model
)

```

10. Find the manufacturers who sell exactly two different models of PC.

```

select DISTINCT P.make
from Product P, Product P1
where P.make=P1.make and
exists (
    select PC1.model
    from PC PC1, PC PC2
    where PC1.model <> PC2.model
    and PC1.model=P.model and PC2.model=P1.model
)

```

```

EXCEPT
select DISTINCT P.make
from Product P, Product P1, Product P2
where P.make=P1.make and P1.make=P2.make

```

```

exists (
  select PC1.model
  from PC PC1, PC PC2, PC PC3
  where PC1.model <> PC2.model
  and PC1.model<>PC3.model
  and PC2.model<>PC3.model
  and PC1.model=P.model
  and PC2.model=P1.model
  and PC3.model=P2.model
)

```

11. Find those pairs of PC models that have both the same speed and RAM. A pair should be listed only once; e.g., list (i, j) but not (j, i).

Hint: The model numbers can be compared.

```

select P1.model, P2.model
from PC P1, PC P2
where P1.model < P2.model and P1.speed = P2.speed
and P1.ram = P2.ram

```

12. Find the manufacturer(s) of the computer (PC or laptop) with the highest available speed.

Hint: the highest speed means that it is not smaller than any other speeds. If you can find all the speeds which are smaller than some speed, you can solve this problem.

```

select DISTINCT P.maker
from Product P
where P.model in (
  select Computer.model
  from (select PC.model, PC.speed
        from PC
        UNION
        select LP.model, LP.speed
        from Laptop LP
       ) AS Computer
  where Computer.speed = (
    select MAX(Computer1.speed)
    from (SELECT PC1.model, PC1.speed
          FROM PC PC1
          UNION
          SELECT Lp1.model, Lp1.speed

```

) FROM Laptop Lp1) AS Computer1)