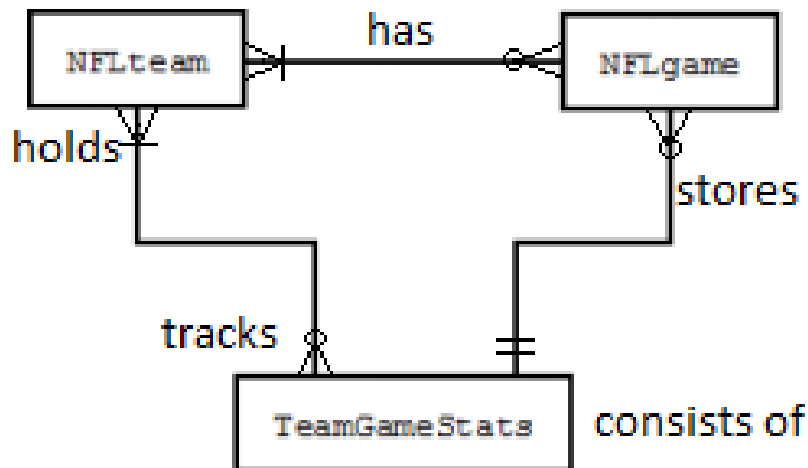


Problem 1:



Problem 2:

The value of the expression  $\pi_{hd}(PC)$  as a set is all the unique values contained in the projection. The values are as follows:

**select distinct (hd) from pc;**  
**[250, 80, 320, 200, 300, 160]**

The value of the expression as a bag is all of the values contained in the projection. The values are as follows:

**select hd from pc;**  
**[250, 250, 80, 250, 250, 320, 200, 250, 250, 300, 160, 160, 80]**

Taking the sum of each list and calculating we get

Average value of the list as a set: **218.33**

**ij> select avg (distinct hd) from pc;**

**1**

-----

**218**

Average value of the list as a bag: **215.38**

**ij> select avg (hd) from pc;**

**1**

-----

**215**

### Problem 3:

Given the two relations:

R (A, B): {(0,1), (2,3), (0,1), (2,4), (3,4)}

S (B, C): {(0,1), (2,4), (2,5), (3,4), (0,2), (3,4)}

Compute  $\pi_{B+1,C-1}(S)$ : Select tuples B and C by B+1 and B-1

**{(1,0), (3,3), (3,4), (4,3), (1,1), (4,3)}**

Compute  $\tau_{B,C}(S)$ : Order by B and then C

**{(0,1), (0,2), (2,4), (2,5), (3,4), (3,4)}**

Compute  $\delta(S)$ : Getting all distinct tuples

**{(0,1), (2,4), (2,5), (0,2), (3,4)}**

### Problem 4:

Find the distinct manufacturers of printers.

```
ij> select distinct (maker) from product,printer where product.model = printer.model;
MAK&
-----
D
E
H
3 rows selected
```

Find the model number, memory size, and screen size for laptops costing less than \$1500

```
ij> select model, ram, screen from laptop where price < 1500;
MOD&|RAM      |SCRE&
-----
2002|1024        |17.0
2003|512         |15.4
2004|512         |13.3
2007|1024        |13.3
2008|1024        |15.4
2009|512         |14.1
6 rows selected
```

Find all the rows in the printer table for color printers

```
ij> select * from printer where color='true';
MOD&|COLOR|TYPE   |PRICE
-----
3001|true |ink-jet |99
3003|true |laser  |899
3004|true |ink-jet |120
3006|true |ink-jet |100
3007|true |laser  |200
5 rows selected
```

Problem 5:

Find the class name and country for all classes with 8 guns

```
SQL> select class, country from classes where numguns = 8;
```

country	class
Germany	Bismark
Japan	Kongo
Gt. Britian	Revenge

Find the names of the ships sunk in battle and the name of the battle in which they were sunk

```
SQL> select ship, battle from outcomes where result = 'sunk'
```

battle	ship
North Atlantic	Bismark
Surigao Strait	Fuso
North Atlantic	Hood
Guadalcanal	Kirishima
North Cape	Scharnhorst
Surigao Strait	Yamashiro

Find all ships that begin with the letter "R"

```
select * from ships where name like 'R%';
```

Problem 6:

Find the model number, price, and type of all products (any type) made by manufacture "D"

```
ij> select pc.model, pc.price, product.type from product, pc where product.model = pc.model and product.maker = 'D' union select laptop.model, laptop.price, product.type from product, laptop where product.model = laptop.model and product.maker = 'D' union select printer.model, printer.price, printer.type from product, printer where product.model = printer.model and product.maker = 'D';
```

```
MOD&|PRICE|TYPE
```

```
-----  
1008|770 |pc  
1009|650 |pc  
1010|770 |pc  
3004|120 |ink-jet  
3005|120 |laser
```

```
5 rows selected
```

Find the hard disk sizes that occur in two or more laptops

```
ij> select hd from laptop group by hd having count(hd)>=2;
```

```
HD  
-----  
60  
80  
120
```

```
3 rows selected
```

Problem 7:

Find the ships heavier than 35,000 tons

```
select name from ships where class (select class from classes where displacement > 35000)
```

List all the ships mentioned in the database

```
select ship from sys. tables
```

Problem 8:

Find the printers with the highest price

```
ij> select * from printer where price >= all (select price from printer);
MOD&|COLOR|TYPE    |PRICE
-----
3003|true |laser    |899

1 row selected

ij> select model from printer where price = (select max (price) from printer);
MOD&
----
3003

1 row selected
```

Find the model number of the highest priced item in the database

```
ij> select model from ( select model, price from pc where price = (select max(price) from
pc) union select model, price from laptop where price = (select max(price) from laptop) un
ion select model, price from printer where price = (select max(price) from printer) ) as p
where price = (select max(price) from ( select model, price from pc where price = (select
max(price) from pc) union select model, price from laptop where price = (select max(price
) from laptop) union select model, price from printer where price = (select max(price) fro
m printer) ) as pp);
MOD&
----
2001

1 row selected
```

```
ij> select distinct model from(select model, price from pc union all select model, price f
rom printer union all select model, price from laptop) p where price >= all(select max(pri
ce) from pc union all select max(price) from printer union all select max(price) from lapt
op);
MOD&
----
2001

1 row selected
```

Problem 9:

Find the countries whose ships had the largest number of guns

```
select C.country from classes C where numGuns >= all (select numGuns from classes);  
select C.country from classes C where numGuns in (select max(numGuns) from classes);
```

Find the battles in which ships of the Kongo class participated

```
select O.battle from Outcomes O where O.ship in (select S.name from Ships S where S.class  
= 'Kongo');
```

```
select distinct O.battle from Outcomes O where O.ship = any (select S.name from Ships S  
where S.class = 'Kongo');
```

Problem 10:

Find the average speed of PCs

```
ij> select avg(speed) from pc;  
1  
-----  
2.4846153846153842  
  
1 row selected
```

Find, for each different type, the average price of a printer

```
ij> select type, avg(price) from printer group by type;  
TYPE      |2  
-----  
ink-jet   |106.3333  
laser     |364.5000  
  
2 rows selected
```

Problem 11:

Find the average number of guns of battleship classes

```
select class, avg(numGuns) from classes group by class
```

Find for each class the number of ships of that class sunk in battle

```
select S.class, count(O.ship) from ships S, (select * from Outcomes where result = 'sunk') O  
where S.name = O.ship group by S.class;
```

An Aggie does not lie, cheat, steal, or tolerate those who do.