employee (*ID, person_name, street, city*)
works (ID, *company_name, salary*)

Figure 1

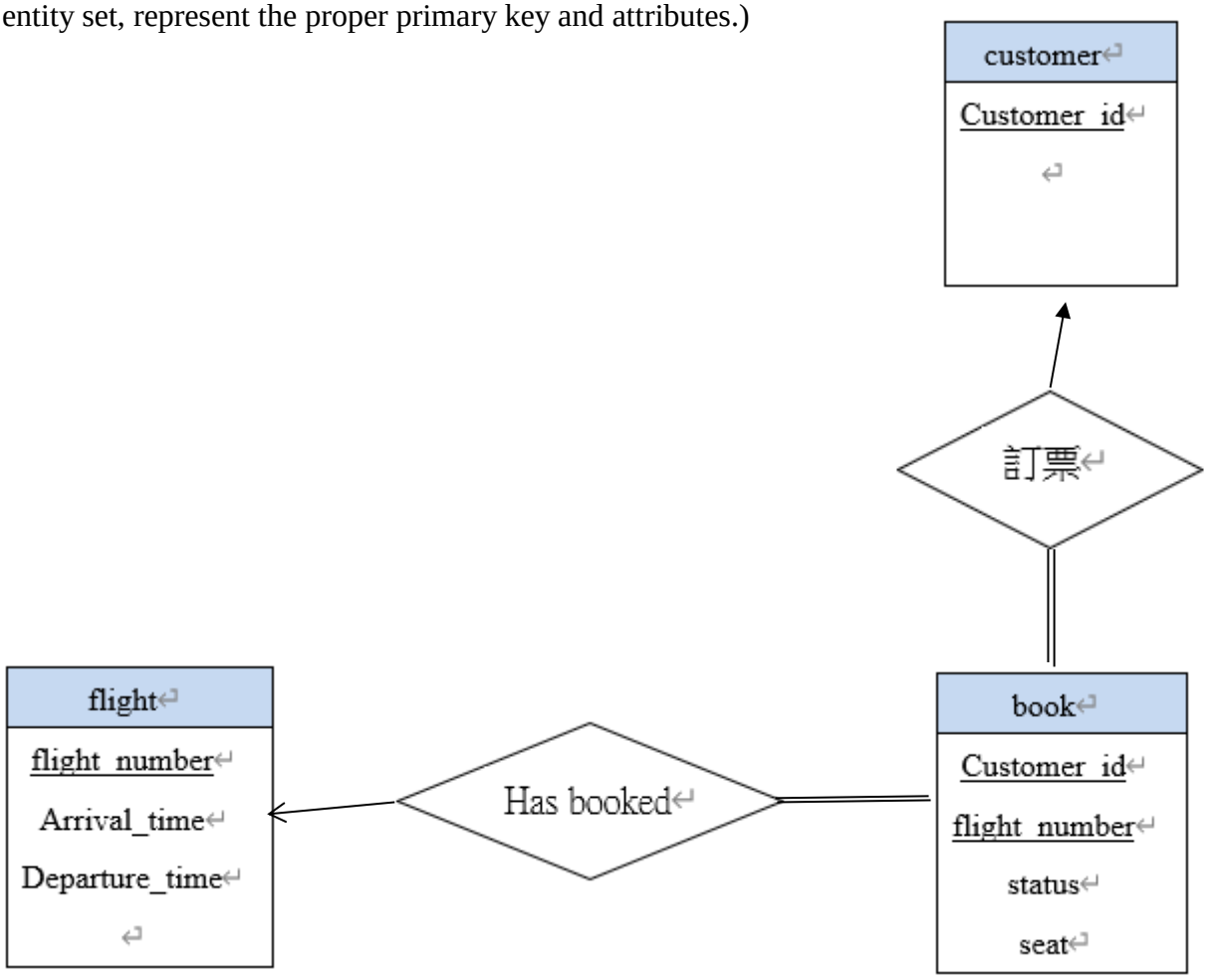
1. (20%) Consider the employee database with two relations in Figure 1.
   (1) Write a function **avg_salary** that takes a company name as an argument and finds the average salary of employees at that company.

```
Select avg(salary) as avg_salary
From works
Group by company ;
```

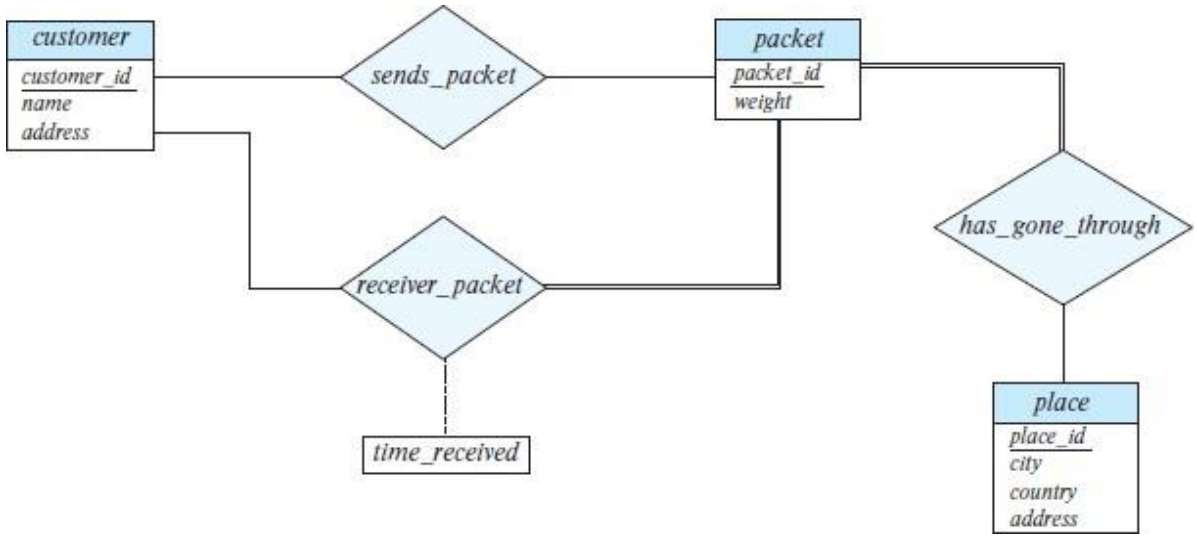
   (2) Write an SQL statement, using the **avg_salary** function, to find companies whose employees earn a higher average salary than the average salary at "FirstBank".

```
Select company
From works
Group by company ;
having avg(salary) > ( Select avg(salary) From works Where company_name = 'FirstBank' Group by company)
```

2. (20%) Design a database using the ER-diagram for an airline. The database must represent the information of each **flight (航班)**, including its flight number and schedules (起飛降落的日期時間). The database also needs to keep track of **customers** and their **reservations** on individual flights, including the status and seat assignments. (Design the proper entity sets and relationship sets. For each entity set, represent the proper primary key and attributes.)



3. (20%) Construct appropriate relational schemas for the E-R diagram in Figure 2. For each relational schema, represent the proper attributes and primary key.



customer(customer_id , name , address)
packet(packet_id , weight , customer_id)
place(place_id , city , country ,address , packet_id)
receiver_packet(customer_id , packet_id , time_received)

Figure 2

4. (20%) List two nontrivial functional dependencies satisfied by the relation in Figure 3. Explain your answer.

A → B and C → B

A	B	C
a1	b1	c1
a1	b1	c2
a2	b1	c1
a2	b1	c3

Figure 3

5. (20%) Consider the schema R = (A, B, C, D, E, G) and the set F of functional dependencies as follows:
{AB → CD, B → D, DE → B, DEG → AB, AC → DE}.

(1) Prove that AB is not a superkey
1.result = AB
2.result = ABCD
3.result = ABCDE
4.result = no more
Because : ABCDE != R
So : AB is not a superkey

(2) Prove that DEG is a superkey.
1. result = DEG 2.
2. result = ABDEG
3. result = ABCDEG(all)
Because ABCDEG = R
So DEG is a superkey

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