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

Figure 1

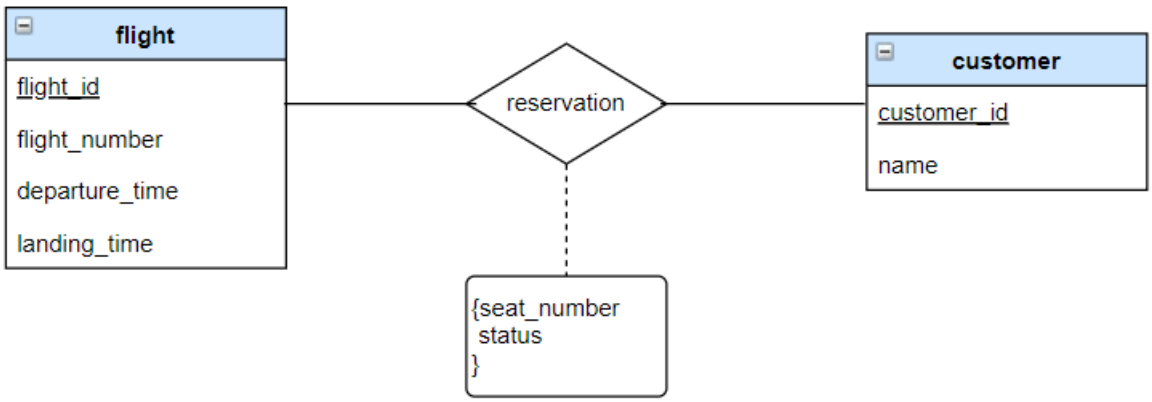
1. (20%) Consider the employee database with two relations in Figure 1.
   (1) Write a function **avg_salary** that takes a company name as an argument and finds the average salary of employees at that company.

```
create function avg_salary(i_cmpName varchar(20))
    returns integer
    begin
    declare ret integer;
        select avg(salary) from works where company_name = i_cmpName;
    return ret;
    end
```

   (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 distinct company_name from works where avg_salary(company_name) > avg_salary('FirstBank')
```

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.)



flight(flight_id, flight_number, departure_time, landing_time)
customer(customer_id, name)
reservation(flight_id, customer_id, seat_number, status)

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.

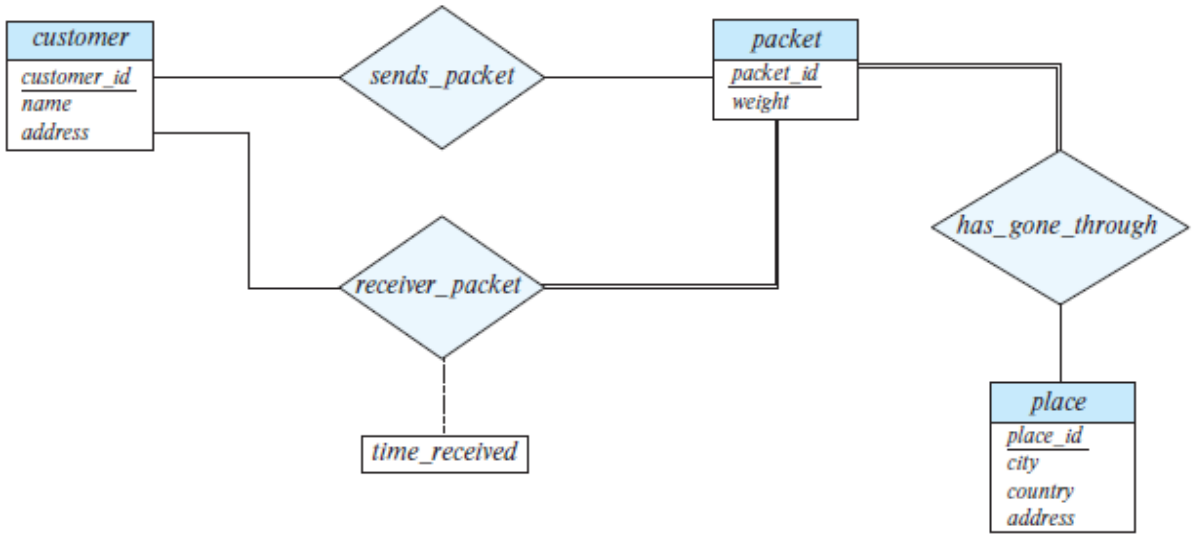


Figure 2

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

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

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

Figure 3

1. A->B
   A 給一個值，可以找到唯一的 B 值
   (a1->b1), (a2->b1)
2. {A, C}->B
   {A, C}的值可以找到唯一的 B 值
   ({a1, c1}->b1), ({a1, c2}->b1), ({a2, c1}->b1), ({a2, c3}->b1)

5. (20%) Consider the schema R = (A, B, C, D, E, G) and the set F of functional dependencies as follows:

$$\{AB \rightarrow CD, B \rightarrow D, DE \rightarrow B, DEG \rightarrow AB, AC \rightarrow DE\}.$$

(1) Prove that AB is not a superkey.
   {AB}:
   = {AB} = {ABCD} = {ABCDE}
   $R \neq (AB)^+$, 所以 AB 不是 superkey

(2) Prove that DEG is a superkey.
   {DEG}:
   = {DEG} = {ABDEG} = {ABCDEG}
   $R = (DEG)^+$, DEG 是 superkey

Note: Please submit your homework in a single PDF file to TronClass by 12/20/2023 11:59pm.