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

Figure 1

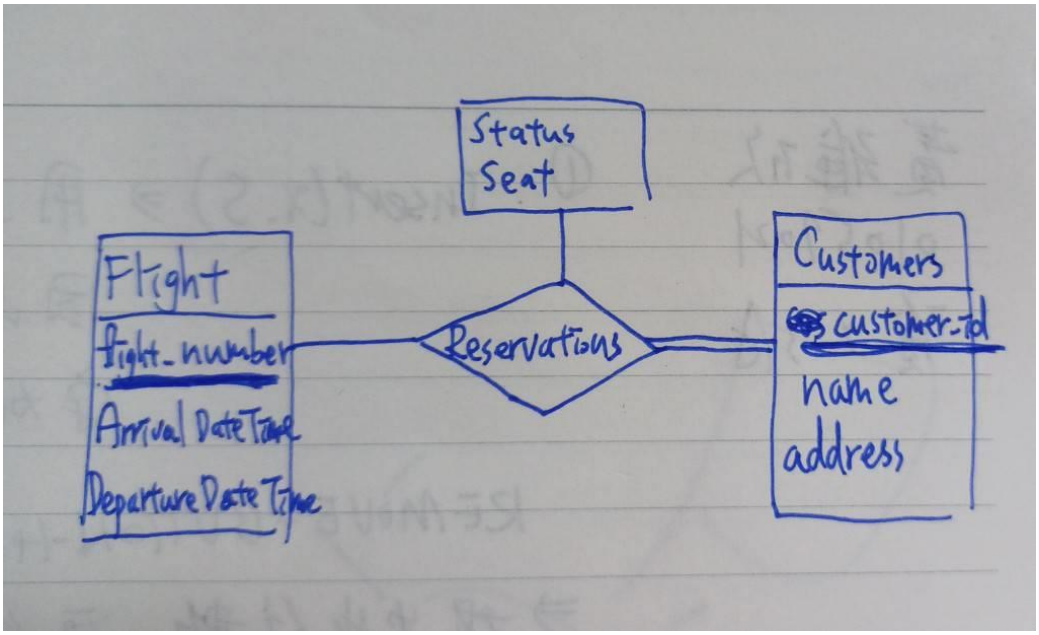
1. (20%) Consider the employee database with two relations in Figure 1.
   (1) Write a function **avg_salary** that takes a company name as an argument and finds the average salary of employees at that company.

```
create function avg_salary(company_name varchar(30))
return integer
begin
    declare avg integer;
        select avg(salary) into avg
        from works
        where works.company _name = company_name;
    return avg;
end
```

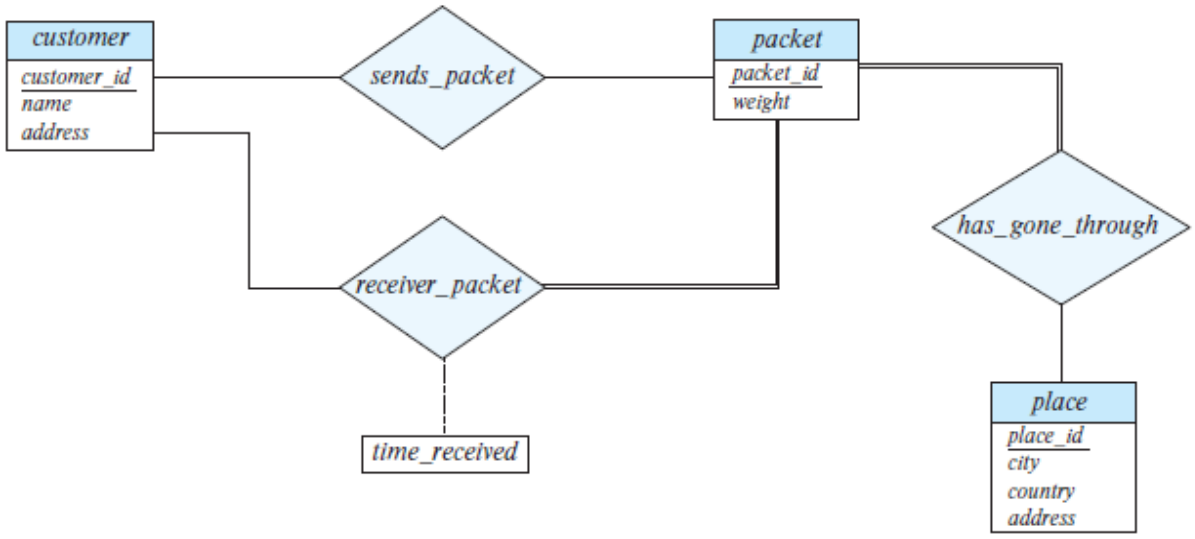
   (2) Write an SQL statement, using the **avg_salary** function, to find companies whose employees earn a higher average salary than the average salary at "FirstBank".

```
select dept_name
from works
where avg_salary(dept_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.)



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(PK), name, address)
packet(packet_id(PK), place_id(FK), customer_id(FK), city, country, address)
place (place_id(PK), city, country, address)

Figure 2

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

A→B
C→B

Functional dependency 的定義是一組屬性可以唯一地對應到另一個，
簡單來說就是可以多對一或是一對一，但不可以一對多(無法唯一的確定)。
Nontrivial 的話就是 X→Y，Y 要被包含在 X 裡。
從圖表來看 a1→b1，a2→b1，B 不被包含在 A 裡，所以 A→B。
c1→b1, c2→b1，c3→b1，B 不被包含在 C 裡，所以 C→B。

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.

Result1: ABCD(AB → CD, B → D)

Result2: ABCDE (AC → DE，AC 包含於 ABCD)

Result 不包含 G，沒辦法組成完整的 R，所以 AB 不是 superkey。

(2) Prove that DEG is a superkey.

Resul1:ABDEG

包含 AB，呈上題，最終結果會有 ABCDE，起點 DEG 剛好彌補了上一題沒有 G 的問題，因此 DEG 是 superkey。

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