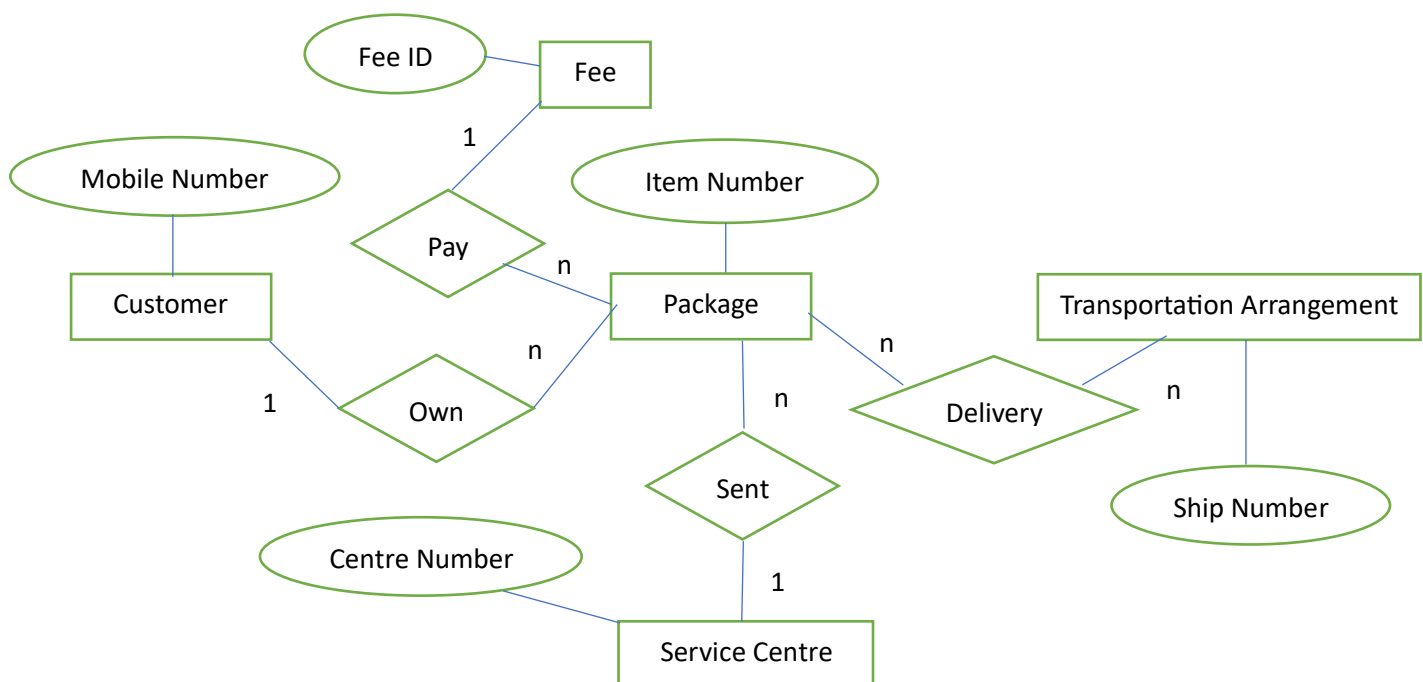


## Homework Assignment #1

(Due: Monday Oct 16, 2023 to submit via Blackboard System)

## Question A. (60 marks)

- 1) ABC Courier Company provides fast deliveries of packages. For good services, the company needs to have its up-to-date information on the processing and current location of each package. When a customer (e.g. Peter) requires a delivery service, Peter brings a package at a service centre. Then, Peter provides his name, service mode (i.e. fast, regular) and mobile number. Packages can be characterized by item number (unique), weight, dimensions, insurance amount, destination, and final delivery date. Also, he pays a fee based on the service mode and the weight of his package. The service centres are characterized by their types, unique centre numbers, and addresses. Packages make their way to their destination one or more transportation arrangements (i.e., train, van, truck deliveries). These transportation arrangements are characterized by a unique shipNumber, a type (e.g. train, van, truck), and a completion timestamp. Design an ER schema for this application, stating any extra assumptions you have like to make. [30 marks]



## Entities (10 marks)

1. Customer (PK: Mobile Number)
2. Package (PK: Item Number)
3. Service Centre (PK: Centre Number)
4. Transportation Arrangement (PK: Ship Number)
5. Fee (PK: Fee ID)

## Relationships (10 marks)

Assumptions (10 marks)

1. Each package is owned by one customer; Each customer can own one or more packages with different service modes.
  2. Each package is sent from one service centre; Each service centre can send one or more packages.
  3. Each package is delivered by one or more transportation arrangements; Each transportation arrangement can deliver one or more packages.
  4. A fee needs to be paid for each package; Packages with the same weight and service mode should be paid with the same fee.
- 2) For your ER diagram given above, convert it into a relational schema using the mapping guidelines discussed in the lecture. For each relation (table) obtained, specify the name and its attributes, as well as its primary key and foreign key(s). [30 marks]

Relations (15 marks)

1. Customer:
  - Attributes: Name, Mobile Number
2. Package:
  - Attributes: Item Number, Weight, Dimension, Insurance Amount, Destination, Final Delivery Date, Service Mode, Fee ID, Mobile Number, Centre Number
3. Service Centre:
  - Attributes: Centre Number, Type, Address
4. Transportation Arrangement:
  - Attributes: Ship Number, Type, Completion Timestamp
5. Fee:
  - Attributes: Fee ID, Weight, Service Mode, Cost
6. Delivery:
  - Attributes: Item Number, Ship Number

Primary and Foreign Keys (15 marks)

1. Customer:
  - PK: Mobile Number
2. Package:
  - PK: Item Number
  - FK: Fee ID, Mobile Number, Centre Number
3. Service Centre:
  - PK: Centre Number
4. Transportation Arrangement:
  - PK: Ship Number
5. Fee:
  - PK: Fee ID
6. Delivery:
  - PK: (Item Number, Ship Number)
  - FK: Item Number, Ship Number

Question B. (40 marks)

Data.One is the Hong Kong Government Open Data portal. It has included many datasets available. Amongst health datasets, the influenza surveillance data including sentinel surveillance, laboratory surveillance, influenza-like illness outbreak, hospital surveillance and severe influenza case during influenza season.

Formulate and test in ORACLE SQL the following SQL statements (e.g. CREATE, INSERT, SELECT), and save your answer into a file. Test out the answers on the Oracle DBMS first before uploading the file to the BB System.

- 1) Define the database schema based on the dictionary of the influenza surveillance data ([https://www.chp.gov.hk/files/pdf/flux\\_spec\\_en.pdf](https://www.chp.gov.hk/files/pdf/flux_spec_en.pdf)). [8 marks]

```
CREATE TABLE FLUX (  
  Year NUMBER,  
  Week NUMBER,  
  FROMDATE DATE,  
  TODATE DATE,  
  ILI_GOPC NUMBER,  
  ILI_PMP NUMBER,  
  H1 NUMBER,  
  H3 NUMBER,  
  B NUMBER,  
  AandB NUMBER,  
  H1_proportion NUMBER,  
  H3_proportion NUMBER,  
  B_proportion NUMBER,  
  AandB_proportion NUMBER,  
  ILI_School NUMBER,  
  ILI_NonSchool NUMBER,  
  Adm_0_5 NUMBER,  
  Adm_6_11 NUMBER,  
  Adm_12_17 NUMBER,  
  Adm_18_49 NUMBER,  
  Adm_50_64 NUMBER,  
  Adm_65_higher NUMBER,  
  Adm_All NUMBER,  
  ILI_AED NUMBER,  
  Fever_CCCGK NUMBER,  
  Fever_RCHE NUMBER,  
  ILI_CMP NUMBER,  
  SevereCase_0_17 NUMBER,  
  SevereCase_18_49 NUMBER,  
  SevereCase_50_64 NUMBER,  
  SevereCase_65_higher NUMBER  
);
```

- 2) Load the dataset from Data.One (<https://data.gov.hk/en-data/dataset/hk-dh-chpsebceddr-flu-express>). [7 marks]

```
INSERT INTO FLUX VALUES (2014, 1, TO_DATE('29/12/2013 00:00:00', 'dd/mm/yyyy
hh24:mi:ss'), TO_DATE('04/01/2014 00:00:00', 'dd/mm/yyyy hh24:mi:ss'), NULL, 45, 93,
111, 64, 268, 0.043, 0.0513, 0.0296, 0.1238, 0, 2, 1.703, 0.425, 0.052, 0.084, 0.158,
0.404, 0.234, 198, NULL, 0.0009, 3.86, 0, 1, 3, 1);
...
```

- 3) Find the unique weeks which the months of starting date (FROM) and ending date (TO) are different. (e.g. FROM: 29/12/2013 and TO: 4/1/2014 => Week: 1) [5 marks]

```
SELECT DISTINCT WEEK FROM FLUX WHERE EXTRACT(MONTH FROM
FROMDATE)!=EXTRACT(MONTH FROM TODATE);
```

- 4) Find out the years and weeks which H1 (number of positive detections of influenza A(H1) virus) and B (number of positive detections of influenza B virus) are both above 50. [5 marks]

```
SELECT YEAR,WEEK FROM FLUX WHERE H1>50 AND B>50;
```

- 5) Find all years and their averages of H1 except Week 5 nor Week 12. List the results in the ascending order of the averages of H1. [5 marks]

```
SELECT YEAR,AVG(H1) as avg_of_H1 FROM FLUX WHERE WEEK!=5 AND WEEK!=12
GROUP BY YEAR ORDER BY avg_of_H1 ASC;
```

- 6) Find weeks and the total of H1 across all years except 2016 nor 2019 when the total of H1 is more than 200. [5 marks]

```
SELECT WEEK,SUM(H1) as sum_of_H1 FROM FLUX WHERE YEAR!=2016 AND
YEAR!=2019 GROUP BY WEEK,YEAR HAVING SUM(H1)>200;
```

- 7) Find the weeks which have more H1 than every week in 2016 and 2019. [5 marks]

```
SELECT WEEK FROM FLUX WHERE H1>ALL(SELECT H1 FROM FLUX WHERE
YEAR=2016 AND YEAR=2019);
```

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\*Remark: Please remember to include your name and student ID# in each of your answer sheets for Question A; upload a scanned copy of your answers.