# INFO90002 S1 2019 Exam Revision No 3.

## 1. Ali-boo-boo Cards Case Study

Ali-boo-boo offers three types of cards to its customers, a Visa Debit Card, a Visa Credit Card and a Mastercard Credit Card. For each customer we record a customer id, first name, last name, and mobile number. Each card has an account id, card number, expiry date, card brand (Visa, Mastercard) and what type it is (debit or credit). For debit cards we store the current balance, date the card was first used and date when the PIN was last changed.

For any online purchase made by cards, we need to store the transaction date/time and the total amount of the transaction.

Draw a **Physical Model** of the Ali-boo-boo Cards case study

## 2. SQL

The Rotterdam metro has three lines, the Northern line, the Western line and the Eastern line. All three lines travel through the Centraal Stop. Each line has two zones and a number of stations. All stations outside of Zone 1 belong to Zone 2. There are two ticket prices: Adult and Concession.

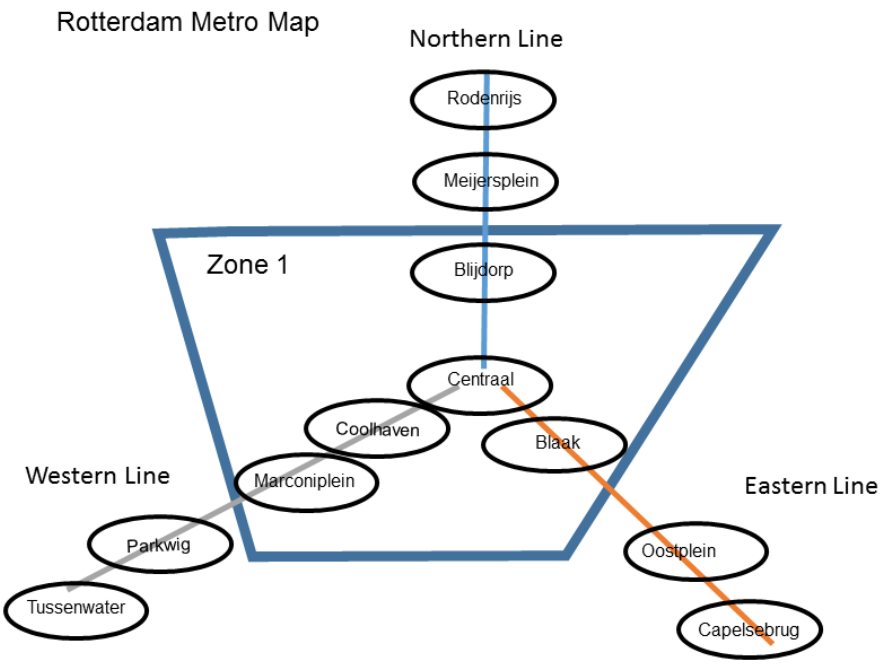


*Figure 1: Rotterdam Metro Stations*

Below is a model of the Rotterdam Metro database.

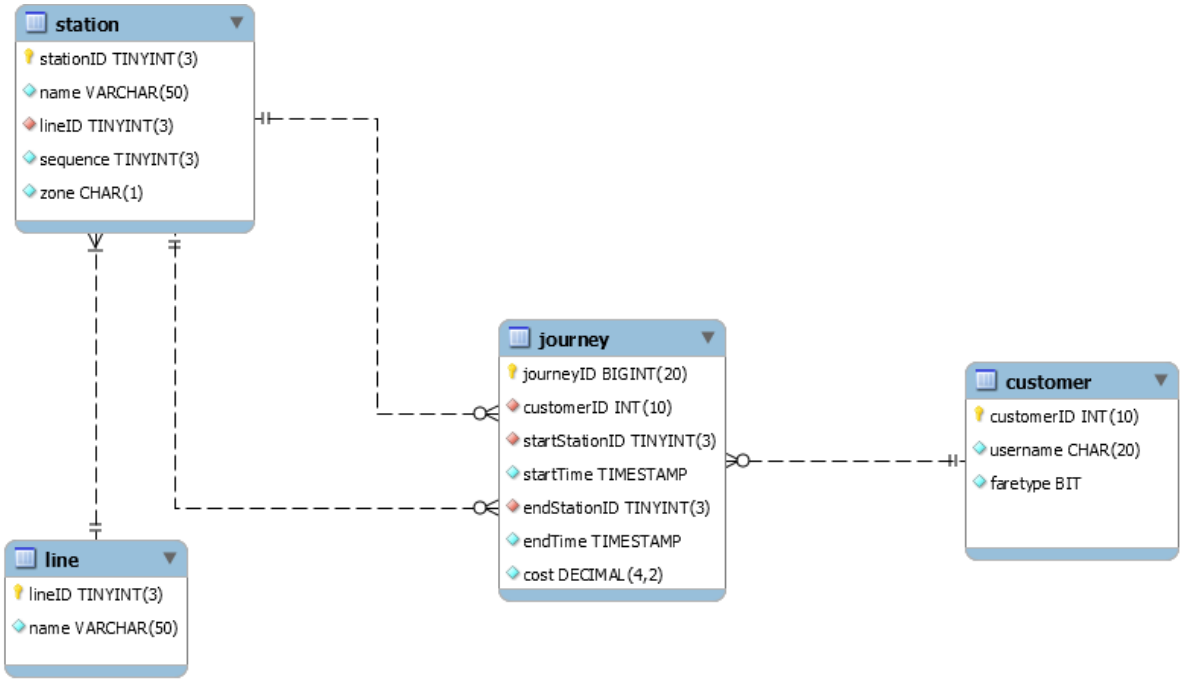


*Figure 2: ER Model of Rotterdam Metro database*

Write a *single* SQL statement to correctly answer each of the following questions
DO NOT USE VIEWS to answer questions. Query nesting is allowed.

**2.1**. Write an SQL query to list all station names on the Western line in sequence.

**2.2**. Write an SQL query to list the usernames of customers who travel on full fare, the total number of journeys the customer has taken, and total price paid for these journeys. For customers with full fare, the faretype is set to 1.

**2.3**. Write an SQL query to list the names of stations that have never had a journey start or end from that station.

**2.4**. Write an SQL query to list the usernames of customers who have travelled on all lines.

## 3. Normalization

Normalize the relation below to 3rd Normal Form (**3NF**).
The table below is part of the medical records for a Veterinarian's practice.

VET_SURGERY (PET_ID, PET_NAME, TYPE, OWNER_ID, OWNER_NAME, MOBILE, VISIT, PROC_ID, PROC_DESC)

The combination of PET_ID and VISIT is the key for the table. The following functional dependencies hold:

- PET_ID determines PET_NAME, TYPE, OWNER_ID
- OWNER_ID determines OWNER_NAME, MOBILE
- VISIT determines PROC_ID, PROC_DESC

## 4. Transactions

Relational Databases must solve the problem of the lost update problem. Explain what the lost update problem is. Use a diagram to demonstrate your answer.

## 5. NoSQL

Explain the difference between ACID properties of relational databases and BASE properties of NoSQL databases.