POLITÉCNICO DE LEIRIA
ESCOLA SUPERIOR DE TECNOLOGIA E GESTÃO

BASES DE DADOS

Engenharia Informática, regimes Diurno e Pós-Laboral

2º Ano 1.º Semestre **2018/19**

Conceptual Modeling of Relational Databases - Training Exercises (ERASMUS)

For each of the following exercises you are expected to:

a) Analyze the supplied data;

b) Build the Entity-Relationship Diagram (ERD);

c) Build the Logical Model corresponding to the ERD you draw.

1. The following table is one of the tables of a bank's database. Assume that the IBAN (International Bank Account Number) identifies each bank account. All the accounts of a given account type have the same income.

IBAN	location	customer_id	customer_name	account_holder	balance	account_type	income
…	…	…	…	…	…	…	…
0035 20202020	Celas	11001	Carlos Sousa	Yes	123.03	PPR	2.5%
0035 20202020	Celas	12004	Jorge Ferreira	No	123.03	PPR	2.5%
0035 30303030	Calhabé	13006	Miguel Carmo	Yes	298.00	Ordem	0.4%
0035 30303030	Calhabé	11001	Carlos Sousa	No	298.00	Ordem	0.4%
0035 40404040	Celas	11009	Pedro Mico	Yes	1148.00	Ordem	0.4%
0035 50505050	Câmara	11001	Carlos Sousa	No	329.00	Prazo	2.0%
...	...	...	...	...	...	...	...

2. The following order shows the items bought by the customer Carlos Silva in March 13, 2017. The order was printed from the database of an Informatics assistance store. Assume that the same product cannot appear twice in the same order.

Order nr.: 11253 **Order date:** 13/03/2017

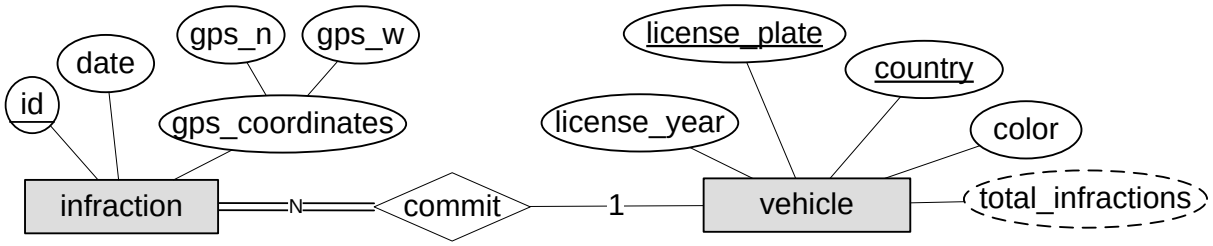
Customer name: Carlos Vieira da Silva **Customer nr:** 435

Customer address: Rua das Oliveiras, 2400 Leiria

Product name	Product id	Amount	Price/unit	Subtotal
Network card TP-LINK 1000Mbps	TG-3468	2	11.90 €	23.80 €
MicroSD Samsung 64GB Class 10	SD-1090	1	40.99 €	40.99 €
USB cable 3m	C-2536	2	5.99 €	10.98 €
			Total	75.77 €

3. The Portuguese National Republican Guard has a division of its own dedicated to traffic control in national roads (the BT-*Brigada de Trânsito* division). Its mission is to enforce traffic laws and to perform sporadic vehicle and driver control. The database used by the BT division currently stores data about all the detected infractions and about vehicles.

The Entity-Relationship Diagram of the database is shown bellow.



a) The BT division intents to catalog the infractions using pre-defined types of infractions (examples: *excessive speed above 30 kms/h*, *excessive speed above 60 kms/h*, *blood alcohol above 1g/l*, etc.). For each of these predefined types of infractions the database must register its severity (*low*, *high* or *very high*) and also a description of the penalty (examples: *driver's license apprehension*, *preventive arrest*, etc.).

b) Some infractions are detected by radars (speed detectors); all other infractions are detected by police officers. Concerning radar-detected infractions, the database will store a picture and the radar data; for each infraction detected by a police officer, the database will know the officer's name, his/her internal id and additional notes regarding the infraction.

c) The BT division schedules its resources accurately so they can be cautiously used in traffic control operations. Thus, the database registers every operation's data (date and place), data about the officers who participated in the operation and data about the police vehicles (*patrol cars*, *motorcycles*, *trailers*, etc.) granted to each.

Each police officer can participate several times in the same operation. for each participation in an operation, the police officer may receive a different vehicle.