

# Databases

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## Session 3

### 1. OBJECTIVE:

1. Understand what is an entity, know how to identify its attributes, understand the role of the PK (and the CKs) and the relational structures (tables) from 2 use cases.
2. Experiment with client-server architecture.
3. Become familiar with relational DB software (Oracle): DataModeller (design) and SQLDeveloper (creation, manipulation, and querying)

### 2. AUTONOMOUS WORK

**Previous Preparation (Recommended):** Review and read the documents Session3\_DesignIntroduction.pdf and for Session3\_BasicERDesign1.pdf.

### 3. MATERIALS

**Theory:** Session3\_DesignIntroduction.pdf, Session3\_BasicERDDesign1.pdf.

**Problems and Practices:** DataModelerTutorialBasic\_EN.pdf

### 4. EXERCISES

#### Requirement: Supermarket

A supermarket wants to create a database of sales made to ATMs. This database must keep information about the tickets and the products available in stock. For each product we want to save the name, brand, price, units in stock and barcode. The barcode is an alphanumeric code that has 5 numbers and a letter at the end. For each sale, the ticket that must contain the total amount, date (day and time), form of payment (cash or card) and box where the purchase was made. We also want to know how many units were sold for each product

**Exercise 4.1.** Identify entities and their attributes.

**Exercise 4.2.** Identify candidate keys (CK) and select a primary key (PK). Explain What the attributes have to fulfil to be CK and identify sets of attributes that cannot be CKs.

**Exercise 4.3.** Open the DataModeller and create the entities with the CK chosen in Exercise 4.2. Assume that all attributes are simple.

**Exercise 4.4.** Translate the previous design to a Relational Model. What structures were created? Save your work for use in the other sessions.

**Exercise 4.5.** Generate the data structure SQL script with the DataModeller. Open SQL Developer and execute the script. What does it take for the script to run? Why? Relate it to any of the BD architectures.

**Exercise 4.6.** Insert the following data:

- Requirements: (3, 30/09/18, card, 3€), (3, 01/10/18, card, 3.25€), (01, 30/09/18, cash, 3.4€), (Milk, Vacona, 0.75, 50, 56790A), (Milk, La munyidora, 1.25, 70,12345Z), (Beer, El monjo, 2.15, 100, 54389Q)

Use the table data tab or the command line insert statement:

Insert into product (name, brand, price, units, barcode) values ('Beer', 'El monjo', 2.15, 100, '54389Q');

**Exercise 4.7.** Now, try to insert this data:

- Requirements : (Milk, Vacona, 1.25, 70, 56790A),

Can you do it? Why?

**Exercise 4.8.** Use DataModeller to create the tables without defining the CK, insert the Exercise 4.6 data, and then do Exercise 4.7 again. What basic property of DBSs is being breached?

## 5. EXERCISE FOR HOMEWORK

### Requirement: Artificial Intelligence

UAB researchers in collaboration with other universities are developing an AI system for the early detection of breast cancer using radiological measurements. In order to develop the diagnostic support system, they have to test different pattern classification algorithms in a set of cases already labelled with their final diagnosis. Researchers need to save the results of those experiments into a DB so that other universities in the project have access to them.

In each case they want to save the case ID (the data have been anonymized according to the data protection regulations), the radiological measurements (average intensity of the lesion, size, eccentricity and kurtosis of the histogram) and the final diagnosis (inflammatory, ductal carcinoma, lobular carcinoma, papillary carcinoma). Of each classification method, they want to save the name, researchers who developed it, and the values of the parameters with which it was executed. Each classifier is tested in a different set of cases chosen at random. They want to save what these cases are and if the method correctly predicted the final diagnosis.

**Exercise 1.** Identify entities and their attributes.

**Exercise 2.** Identify candidate keys (CK) and select a primary key (PK). Explain why you choose each attribute as key.