Tecnologias de Bases de Dados

PROJ2 – Delivery deadline: 25 May 2025

OBJECT-RELATIONAL ASSIGNMENT

ASSIGNMENT GOALS

Think about the possibilities open by the object-relational schema, concerning the relational schema, namely the use of user-defined types, with objects combining data structures and the functions to manipulate them, inheritance, nested tables and vectors, object references and comparison and sorting methods. Develop a small illustrative database.

TEAM

The assignment must be executed by teams of 1 to 2 elements.

SUBJECT

The situation is about data on the municipal budgets over several years. The expenses and revenues for each year are classified according to several headings, of type expense ("D") or revenue ("R"). The headings are structured in parent-children hierarchies. The expenses and revenues are recorded for specific periods, quarters or years. In this assignment, only the annual expenses (AExpenses) and revenues (ARevenues) are relevant.

Each municipality has a code and belongs to a NUT III, which belongs to a NUT II, which belongs to a NUT I, which belongs to a country. The GeoLevel states the aggregation level. The area and the population are also recorded for the various levels of geographic aggregation. Notice that the sum of the areas of the geographic entities that are part of a higher-level entity does not always add precisely to the total area due to rounding errors. The ruling party in the municipality in each period is recorded in the table Leaderships. The parties and coalitions have been broadly grouped in the attribute partyName, so aggregations by a party should use the partyName and not the party acronym.

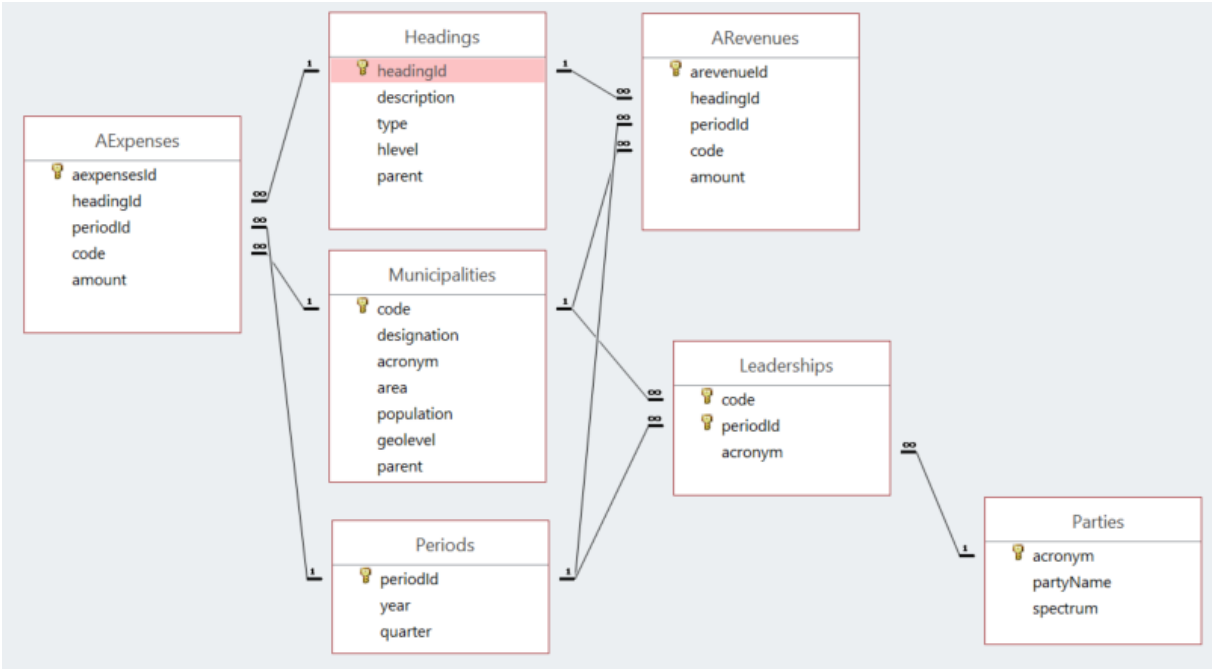

Figure 1 – Relational model for the case Municipal Budgets.

1) Design an object-relational data model for this situation, exploiting the SQL3 extensions. The model may be drawn schematically and then implemented.
2) Populate the object-relational model with the data in the relational database.
3) Add some methods that may be useful for some common SQL queries.
4) Execute some queries on the OR DB.
   a) Calculate the expenses by period and heading of each region's municipalities. Order municipalities by decreasing population.
   b) Check whether the values of the higher-level headings are consistent with the corresponding lower values.
   c) What is the average expense by a thousand inhabitants on each heading for each party?
   d) Which party has more investment per square km each year?
   e) Which party has more salaries per thousand inhabitants each year?
   f) Add a query that illustrates the use of OR extensions.