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Implementation of Databases (WS 18/19)

Exercise 1

Due until October 25, 2018, 10am.
Please submit your solution *in a single PDF file* before the deadline to the L^{2}P system!
Please submit solutions in groups of three students.

Exercise 1.1 (Database Architecture) (14 pts)

1. Name each of the five layers in the database architecture specified in the lecture, explain the concepts handled in each layer, and the interfaces between layers.
2. The following tasks belong to different layers, sort them so that they match the architecture top-down.
   (a) buffering
   (b) logical relation and cursor management
   (c) media access
   (d) access path management
   (e) view formulation and management
3. (a) What does data independence mean?
   (b) Why is it an important feature of database systems?
   (c) How is data independence achieved in the five-layered architecture!

Exercise 1.2 (Query Languages) (16 pts)

The database schema in Figure 1 is given and will be used throughout the exercises. The database dump for the corresponding PostgreSQL database as well as an installation description can be downloaded from the L2P. There you will also find a pdf file describing postgreSQL and its usage.

Formulate the following queries as expressions in **relational algebra** for the first 4 questions below and **SQL** for all the questions(all 5 queries):

1. Find the names of customers who live in the same city as the top employee (The one not managed by anyone).
2. List the names and the countries of those customers who are supported by an employee who was younger than 35 when hired. (HINT: For SQL use year as the first parameter in TIMESTAMPDIFF(). For Relational ALgebra use the function DATEDIFF)
3. Find the managers of employees supporting Brazilian customers.
4. Which artists did not make any albums at all? Include their names in your answer.
5. List the top 5 most purchased tracks over all.

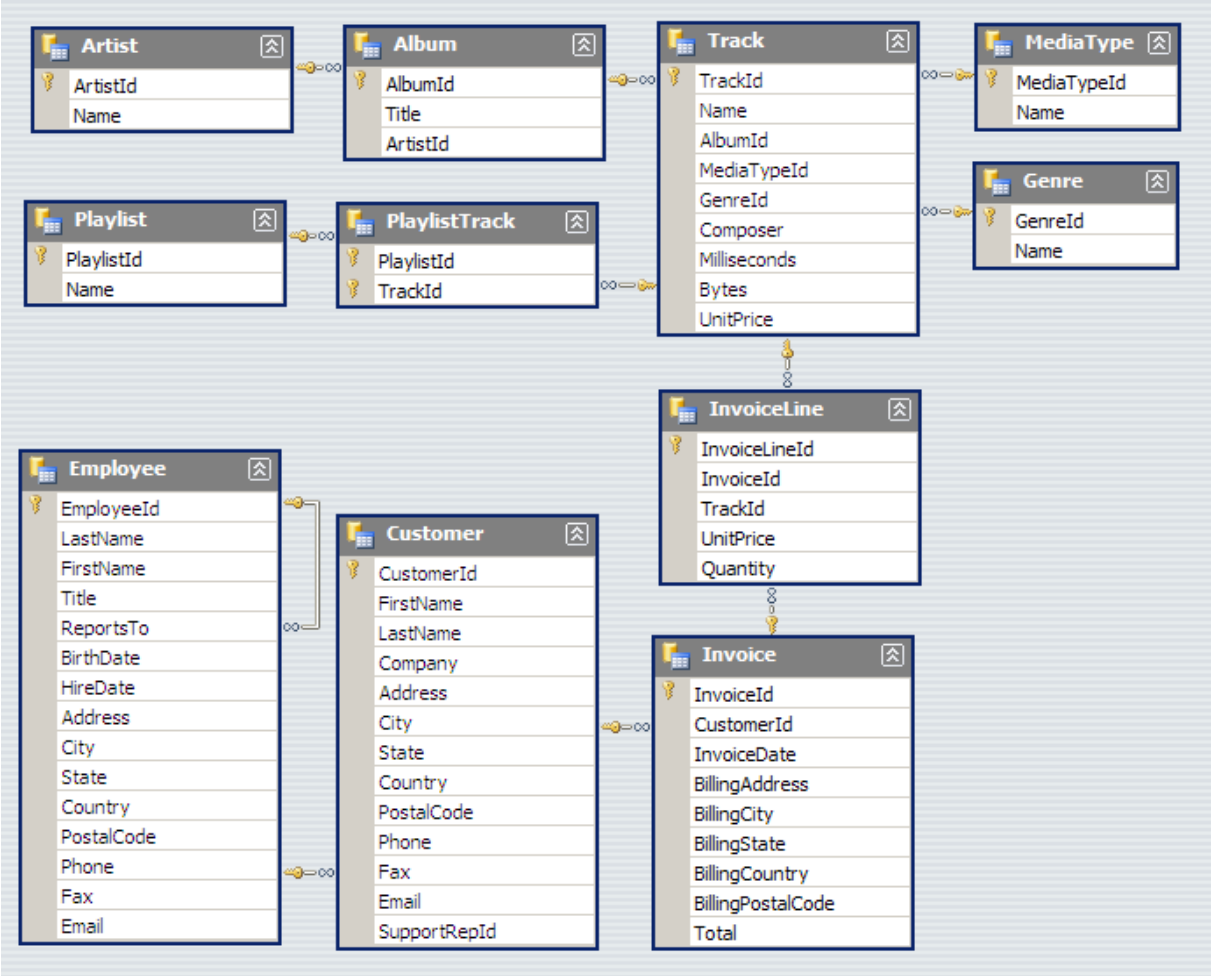

Figure 1: Schema of Chinook database[1]

[1] `http://chinookdatabase.codeplex.com/wikipage?title=Chinook_Schema&referringTitle=Documentation`