Exercise 1

We want to build a relational database about the domain of movies. In particular, we want to store information about movies, directors, actors, location in three distinct relations. Moreover, a relation isDirectorOf stores information about the directors of movies, a relation playsIn stores information about the actors of movies, and a relation filmedIn stores information about the locations where a movie has been filmed.

1. Write SQL statements that define the schema of the above described database;
2. Write SQL statements that insert at least two tuples in each of the tables defined at the previous point;
3. Write SQL statements that express the following queries:
   (a) return the titles of the comedies filmed between 2010 and 2016;
   (b) return the name of every directors who has directed herself/himself as an actor in a movie;
   (c) return the title and year of the movies directed by Italian directors and played by at least one non-Italian actor;
   (d) for every actor, return the number of movies played by that actor and filmed in Italian locations.

Exercise 2

1. Define a file organization for the relations of the schema of Exercise 1 such that the execution of the SQL query relative to point (a) of Exercise 1 is optimized;
2. define a file organization for the relations of the schema of Exercise 1 such that the execution of the SQL query relative to point (b) of Exercise 1 is optimized.

Exercise 3

We want to store a multidimensional structure containing the following information about products:

- quantity (number of items sold)
- type (entertainment, industrial, electronics, food, furniture, hardware)

over the following dimensions:

- Time (datetimestamp, day, week, month, quarter, year)
- Customer (name, city, country, subregion, region, continent)

1. Define a star schema to represent the above multidimensional structure;
2. define a snowflake schema that reduces on both dimensions the redundancy of the star schema defined at the previous point;
3. write an SQL query over the star schema defined at point 1 that returns the quantity sold and the customer name of the food items sold in January 2016;
4. write an SQL query over the snowflake schema defined at point 2 that returns the quantity sold and the customer name of the food items sold in January 2016;
5. write an SQL query over the star schema defined at point 1 that returns, for every European country, the number of electronic items that were sold in that country from January 2014 to December 2015.

Exercise 4

(a) Write an RDF model representing the following statements about URIs Person, Director, Actor, Country, Movie, Comedy, Drama, Male, Female, filmedIn, isDirectorOf, playsIn, bornIn, Ingrid, Cary, Alfred, Notorious, USA, Brazil, UK.

1. Alfred is the director of Notorious;
2. Ingrid and Cary play in Notorious;
3. Notorious was filmed in the U.S.A. and in Brazil;
4. Alfred was born in the U.K.;
5. Ingrid is female;
6. Cary is male.

(b) Write SPARQL queries corresponding to the following requests: (a) return the titles of the comedies filmed in the U.K.; (b) return the name of every director who has directed herself/himself as an actor in a movie. (c) return all the countries where at least one comedy or one horror movie were filmed.

Exercise 5

Consider the information requested in point 2 of Exercise 1. Express such an information using a graph database (e.g., Neo4J).

Exercise 6

Consider the information requested in point 2 of Exercise 1. Express such an information using the MongoDB data model (JSON). Moreover, express the query (a) at point 3 in Exercise 1 as a query in the MongoDB system.