

1. Unit: SPARQL - Warm Up

Exercise 1.1 (Countries and Rivers) Which river touches the highest number of states? Which river touches the highest number of states in relation to its length (consider only rivers that touch at least 4 countries)?

Exercise 1.2 (Countries without common River or Lake) List all pairs of neighbor countries that do not share a river or lake (only one direction and ordered alphabetically).

Exercise 1.3 (Countries with cities that have higher Population than their Capital) For each country give the name, the name of the capital and its population. Also, if there are any, all cities that have a higher population than the capital of this country as a result table of the following form:

Country	Capital	Capital Population	City	City Population
Germany	Berlin	3472009		
Switzerland	Bern	128848	Zürich	384786
Switzerland	Bern	128848	Genf	191557

Exercise 1.4 (Lowest of the highest Mountains) For every continent, determine the highest mountain of that continent (excluding mountains on islands). Return the name of the lowest of these mountains, the country it is located in, and the continent.

Exercise 1.5 (Closest Capitals) For each continent, specify the two capitals that are closest to each other (simplification: use Pythagoras' theorem to determine the distance; justify that this does little to distort the result). The respective countries should be found at least partially on the same continent.

Exercise 1.6 (No Members in Europe) List the names of all organisations that do not have members in Europe.

Exercise 1.7 (Member on every Continent) Find all organizations which have at least one member on every continent. Do not consider the different types of memberships.

Exercise 1.8 (Sahara Population) Determine the population density of the area, which includes Algeria (DZ), Libya (LAR) and all their neighbors.

Exercise 1.9 (Independence of countries) For each country, or other political body, list all countries that became independent from it in chronological order.

Additionally, output an "X", if both countries are neighbors.

Exercise 1.10 (Independence of countries) The goal of this exercise is to examine the behaviour of the OPTIONAL clause. Experiment with it on the basis of the following issues:

- a) Select all countries with (if possible) their independence date, the country/political body it was dependent on and the name of that country/political body.
- b) Consider also those countries that are still dependent from another country: For all countries, return the country (or political body) they are or have been dependent, and if possible, its name.
 - Try both nested OPTIONALS and "parallel" (i.e., disjunctive) ones. What difference in the results do you notice? Does the order matter?

- c) Consider pairs of neighboring countries. If the neighbor was once dependent of the first country, list also its independence date. Try to express the condition by the use of the same variable or by a FILTER clause. Is there a difference?
- d) Consider all pairs of countries. If the first of them once became independent from some other country at all, list the country it was dependent from before, and its independence date. If the neighbor country was once dependent *of the same country*, list also its independence date. Try to express the condition by the use of the same variable or by a FILTER clause. Is there a difference?

Exercise 1.11 (Swiss languages) Consider the languages spoken in Switzerland.

- All country codes of countries in which a language is spoken that is also spoken in Switzerland.
- All country codes of countries in which only languages not spoken in Switzerland are spoken.
- All country codes of countries where only languages spoken in Switzerland are spoken.
- All country codes of countries in which all languages spoken in Switzerland are spoken.

Exercise 1.12 (Network Length of Rivers)

- a) Give for each river its name and total length of its river network (i.e., itself and all its direct and indirect tributaries).
- b) For rivers that are tributaries of another river, give also the name of the river where they finally flow into, which is not itself a tributary of another river.

Exercise 1.13 (Nearest Coast Cities) For every city *in Europe*, give the name, and, if it is located at a sea, the name of this sea.

If it is not located at a coast, give the name of the nearest coastal city in the same country, and the distance. If this does not exist, or if there is nearer coastal city in another country, give also the nearest such city and the distance.