Databases with SQL — B Test from 2022

Short description of this work:

You are working in an astrophysical research team. You are in charge of one of the databases.

The big picture of the database is the following: there is a table containing data about the planets of the solar system, and another table about some satellites of those planets:

- planets: <u>id</u>, name, sun_distance, day_length, type
- satellites: <u>name</u>, #planet_id, diameter, mass

In the table "planets", the primary key is the id (an integer). Each planet has a name, a distance from the sun (in astronomical units), a day length (in hours), and a type (its main composition).

In the table "satellites", the primary key is the name. Each satellite has a planet_id (an external key giving the id of the planet around which it revolves), a diameter (in kilometers) and a mass (in 10^{16} kilograms).

Table 1 is the full table on which you'll work, and Table 2 is an excerpt of the full table (you will work on the full version on computer).

id	name	sun_distance	day_length	type
1	Mercury	0.4	1 408	rock
2	Venus	0.7	5 832	rock
3	Earth	1	24	rock
4	Mars	1.5	25	rock
5	Jupiter	5.2	10	gas
6	Saturn	9.5	11	gas
7	Uranus	19.2	17	ice
8	Neptune	30.1	16	ice

Table 1: The solar system planets — sun distance in astronomical unit, day length in hours.

name	planet_id	diameter	mass
Moon	3	3 474.8	7 342 000
Deimos	4	12.4	0.14762
Phobos	4	22.5334	1.0659
Metis	5	43	3.6
Adrastea	5	16.4	0.20
Amalthea	5	167	208
Thebe	5	98.6	43
Io	5	3 643.2	8 931 900
Europa	5	3 121.6	4 799 800
S/2003 J 18	5	2	0.00042
Eupheme	5	2	0.00042
S/2010 J 2	5	1	0.000052
S/2016 J 1	5	1	0.000052
Mneme	5	2	0.00042
...			

Table 2: The satellites (excerpt) — diameter in kilometers, mass in 10^{16} kilograms.

1 SQL, without computer

For this part, the usage of any electronic device is prohibited.

For each of the following questions, you must write a single SQL request that answers the question.

1. On which planets does one day last more than 24h?

2. Michel wants the list of satellites whose diameter is between 5 km and 30 km. What are their names?

3. Which satellites revolve around Neptune?

BONUS Which satellites are closer to the sun than Mars? For this question, you can safely assume that each satellite is closer to the planet around which it revolves than to any other object in the solar system.

Please also answer the following questions:

4. In the "planets" table, the primary key is the field id. What does it mean?

5. You are the lucky discoverer of a new satellite around Venus, that you choose to call Europa. Explain what you have to change in the "satellites" table to allow for this update. It is not asked to do it.

2 SQL, with computer

This part has to be done on computer; it is a follow-up from the previous section without computer.

You will need the two following files (make sure to put them in the same folder; as usual, you can download them from our course webpage, at the bottom of the page):

http://www.barsamian.am/EE_examens/S6ICT_Annales_TestB/Satellites/BTest_Satellites.py
http://www.barsamian.am/EE_examens/S6ICT_Annales_TestB/Satellites/BTest_Satellites.sql

For each of the following questions, you must write a single SQL request that answers the question. You can answer on paper or in the Python file.

1. Which planets are not gas planets?

2. What are the names of the nine satellites with the biggest diameter?

3. Which satellites revolve around a gas planet?

4. Which satellites have an "e" (capital or not) in their name?

For this BONUS question, you are not limited to only one SQL request. Write a code that can answer the question (write your answer in the function `doQuestionBonus`).

BONUS Which satellites have a year (from 2 000 to this year) in their name?