<u>Class:</u>

S6 ICT

<u>Date:</u>

Tuesday, May the 31st, 2022

<u>Teacher:</u>

Mr Barsamian

B Test — With computer

Family name: _____

First name: _____

Grade: ___ / 10

Duration: 1 hour (60 minutes).

This test has to be done both on paper and on computer. At the end of the test, make sure to upload the python file on the Teams assignment (or on your teacher's USB key).

Some questions are bonuses, and it is highly advised to do them only at the end, when everything else has been done.

If needed, the candidate can also handle some comments inside the code or on paper.

Please keep track of the clock, and avoid spending too much time on a question. Stay focused, and good luck!

Short description of this work:

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

1 Introduction

0 points

Please start by downloading the following files; you'll have to update the python file for this test:

http://www.barsamian.am/2021-2022/S6ICTB/BTest_Satellites.py

http://www.barsamian.am/2021-2022/S6ICTB/BTest_Satellites.sql

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 (full version is in the computer files).

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.

2 Questions 10 points

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 located further than 2 astronomical units from the sun?

2. Michel wants the list of satellites whose mass is between $1 \cdot 10^{16}$ kg and $10 \cdot 10^{16}$ kg. What are their names?

3. What are the names of the four satellites with the biggest mass?

4. Which planets are not rock planets?

5. Which satellites revolve around Neptune?

6. Which satellites revolve around a rock planet?

7. Which satellites have an "a" (capital or not) in their name?

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 answer the following questions on paper.

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

9. 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.

For this last 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 doQuestionBonusTwo).

BONUS Which satellites have a year (from 2000 to this year) in their name?