

DATABASES — B TEST FROM LAST YEAR

Short description of this work:

At Bertrand's local store, there is a special offer: each time he goes and buy something, they give him a figurine. The figurine earned is given at random each time, among 10 different ones (it is thus possible that Bertrand earns a figurine he already has). Each figurine represents a different animal, and he would like to collect them all.

We will simulate how Bertrand's collection grows, and how he can keep track of it.

We start by giving an identifier to each of the 10 different figurines. These identifiers are the numbers between 0 and 9: $\{0, 1, 2, 3, 4, 5, 6, 7, 8, 9\}$.

1 SQL, without computer

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

Bertrand's collection is managed thanks to a database. Each figurine represents a fictional animal with a name, a color and a number of legs, e.g. one of the figurines is a red bird with 2 legs. The primary key for a figurine is its identifier (id, a number between 0 and 9).

Bertrand stores his collection in different drawers. Each week, he changes the drawer in which he puts his new figurines, to avoid losing all of them if something bad happens. Each drawer has a color and is located in a room (no room have two drawers of the same color).

The big picture of the database is the following:

- figurines: id, name, color, nb_legs
- collection: #figurine_id, drawer_color, drawer_room

1. There is a problem with the definition of the table collection: nothing prevents Bertrand from receiving twice the same figurine on a given week, so two figurines in the same drawer could have the same id, preventing this organization to work. Can you explain why this is a problem? How would you solve this problem?

In the following, we make the supposition that during any given week, it's impossible for Bertrand to receive twice the same figurine. Hence, for the remainder of this work, this database is perfectly valid. We give in Table 1 the full table of the different figurines, and in Table 2 an excerpt from Bertrand's collection (this is not the full table).

id	name	color	nb_legs
0	bird	red	2
1	bird	green	3
2	bird	green	2
3	cat	black	4
4	cat	white	3
5	cat	red	4
6	snake	green	0
7	fox	red	4
8	fox	black	4
9	centipede	white	10

Table 1: The 10 figurines.

figurine_id	drawer_color	drawer_room
7	red	living_room
0	red	living_room
2	black	kitchen
3	black	kitchen
0	black	kitchen
4	red	bedroom
5	red	bedroom
4	black	bedroom
5	black	bedroom

Table 2: An excerpt from Bertrand's collection.

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

2. Which of the 10 figurines are red?
3. Which of the 10 figurines have (strictly) more than 3 legs?
4. Which of Bertrand's figurines are in the bedroom?
5. What are Bertrand's figurines that are of the same color than the drawer they are in?

BONUS How many figurines does Bertrand own? How many different ones?

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 <http://www.barsamian.am/2021-2022/S6ICTE/>, at the bottom of the page):

http://www.barsamian.am/2021-2022/S6ICTE/BTest_Figurines_database.py
http://www.barsamian.am/2021-2022/S6ICTE/BTest_Figurines_database.sql

We still work on Bertrand's collection as it has been presented in the previous part.

For each question, you must write a Python code that answers the question in the provided Python file http://www.barsamian.am/2021-2022/S6ICTE/BTest_Figurines_database.py. The code is not required to consist only of SQL requests: additional Python manipulation may be done on the answers you get from SQL requests.

1. In which rooms did Bertrand put figurines with id 0? (fill the function `doQuestionOne`)
2. Which animals are represented on figurines that Bertrand put in the living room? (fill the function `doQuestionTwo`)
3. How many extra figurines with id 0 does Bertrand own? With id 1? With id 2? In total? (fill the function `doQuestionThree`)

Remark: the number of extra figurines with a given *id* is the number of figurines with this *id* Bertrand has minus 1 (or 0 if he does not have this figurine), see the section "Algorithms".

BONUS Which of the 10 figurines represents an animal with the correct, realistic number of legs?