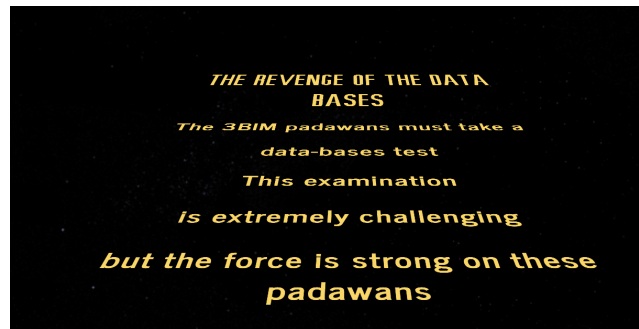


DS BD 3BIM 2021-2022

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1 Exercice 1 (~ 6 points)

A long time ago in a galaxy far, far away... Greef Karga, the leader of a bounty hunter guild has recruited a young Gungan SQLite expert (yes, that is you), in order to organize and query the data from his bounty hunter guild:

Each bounty hunter is described by his name, photo, species, age, creed and is characterized by a unique Bounty Hunter ID. The current location of each bounty hunter is also an important element to be considered. Greef Karga wants to record the planet and the galaxy as well as a unique identifier for each planet. It is also important to record the birth location for each bounty hunter. Each bounty hunter has a collection of weapons, and each weapon is characterized by its code, its type and its builder. Before any mission, a bounty hunter needs to sign a contract with the client. Contracts are characterized by a text, and a unique identifier. When they sign a contract, the client engage a price and sets a deadline, and the salary of the bounty hunter is defined, as well as the mission starting day. The contract also reports the respective targets. Each target is characterized by a name, unique tracking number, species, creed and age.

Questions:

1. Build the Entity/Association model
2. Establish the corresponding Relational model

3. Let us imagine that you created in SQLite a "Bounty Hunter" table with the name and the age, but without other attributes. How would you solve the problem?
4. Greef Karga provides you with a .tsv file with the bounty hunters data, how would you load all this data to your SQLite database?

2 Exercice 2 (~ 10 points)

Write the following queries in SQL and Relational Algebra (if it is possible)

1. Name and age of Mandalorian¹ bounty hunters that have a mission.
2. Name of all Gungans² bounty hunters that are located in the same planet where they were born
3. Name of clients that have payed the mandalorian known as "Din Djarin" to kill a target known as "baby Yoda".
4. List of all Human Mandalorians bounty hunters born in Mandalore
5. List of the names of the clients that hired a Gungan bounty hunter that uses a light-saber and a blaster, we also want the name of the bounty hunter.
6. List of all bounty hunters recruited by "Jabba the Hutt"
7. Amount of "imperial credits"³ payed by each client sorted by increasing order
8. List of all Gungan Siths⁴ that have at least one contract involving a salary higher than 1000 imperial credits.
9. List of bounty hunters hired to kill a target older than themselves
10. All targets killed by "Jango Fett".
11. List of bounty hunters hired to kill another bounty hunter that is on service
12. List of bounty hunters that are in "Coruscant".
13. Amount of imperial credits received by each bounty hunter sorted in increasing order.
14. All possible information involving someone called "Boba Fett".

¹Mandalorian is a creed

²Gungan is a species

³Money currency

⁴Sith is a creed

15. Let $Padawan(Name : STR, LastName : STR, ID : INT)$ be a relation of Padawans that took the DataBases exam. An unknown client has signed contracts with Greef Karga to hunt the padawans that failed the exam. Provide the names of these padawans as well the name of the client (we assume that there are no other contracts involving padawans).

3 Exercise 3 (~ 2 points)

1. Explain the difference between Document-oriented and a Key-oriented NoSQL databases?
2. Explain the limits of pseudo-anonymization and how they can be exploited by an attacker.
3. Greef Karga would like to anonymize some sensitive information of his bounty hunters. Given that the definition of "Sensitive data" studied in the lecture holds for the Star Wars universe, which attributes should be anonymized? Propose a methodology.

4 Exercise 4 (~ 2 points)

Let $R(ABCDEFGHIJKLM)$ be the universal relation, and let $F = \{GH \rightarrow AC, G \rightarrow M, M \rightarrow EID, E \rightarrow LBH, J \rightarrow K\}$ the minimal cover.

1. Find the key of R
2. Which is the normal form of R ?
3. Decompose R to NF3 (explain each step)