

CSC3170 Introduction to Database Systems (Fall 2021)

Assignment 2

Please answer all the questions below (total 100 marks) and submit your solution to the blackboard before 11:59 pm **November 10, 2021**

Note: Write the following queries in relational algebra. Note that some of these queries may not be expressible in standard relational algebra taught in the lectures. For such queries, explain why they cannot be expressed.

Part 1 Consider the following data schema:

Flight (flno, from, to, distance, departs, arrives)

Aircraft (aid, amanufacturer, cruisingrange)

Employee (eid, ename, salary)

Certified (eid, aid)

Details:

- Employee relation describes pilots and other kinds of employees as well;
- Every pilot is certified for some aircraft (otherwise, he or she would not qualify as a pilot), and only pilots are certified to fly.
- aid of Certified is a foreign key referring to aid of Aircraft.
- eid of Certified is a foreign key referring to eid of Employee.
- An aircraft can be used for a non-stop flight if its cruising range is greater than the flight distance.

1. Find the flno(s) and arrives of flight(s) that fly to HK.
2. Find the eid(s) of pilot(s) certified for aircrafts with cursing range not less than 8,000(unit: miles).
3. Find the salary of the pilot who are certified for the largest number of Boeing aircrafts.
4. Find the aid of the aircraft that has the largest cruising range.
5. Find the salary(-ies) of pilot(s) who can fly non-stop flights from New York to Los Angeles but are not certified for any Airbus aircraft.

Part 2 Consider the following data schema:

Creature (name, category, status)

FoodChain (predator, food, percentage)

Details:

- The values of status in Creature can be:
Critically Endangered,
Endangered,
Vulnerable,
Near Threatened,
Least Concern.
- predator of FoodChain is a foreign key referring to name of Creature.
- food of FoodChain is a foreign key referring to name of Creature.

1. Find the predator(s) whose food is all known in Creature.

(For a predator, if the percentages of its food sum up to 100%, we say that its food is all known.)

2. Find the category(-ies) of creatures eaten by both eagle(s) and leopard/tiger(s).

3. Find the name(s) of creature(s) which eat all predators of critically endangered Amphibia(category) creature.

4. Find the name(s) and status of all predator(s) which do not eat themselves.

5. Find creature(s) which are eaten by exactly three predators.