CHAPTER 8

Complex Data Types

Solutions for the Practice Exercises of Chapter 8

Practice Exercises

8.1

Answer:

a. FILL IN
b. FILL IN
c. FILL IN
d. FILL IN

8.2

Answer:
FILL IN

8.3

Answer:
For this problem, we use table inheritance. We assume that MyDate, Color and DriveTrainType are pre-defined types.

create type Vehicle
    (vehicle_id integer,
     license_number char(15),
     manufacturer char(30),
     model char(30),
     purchase_date MyDate,
     color Color)
create table vehicle of type Vehicle

create table truck
  (cargo_capacity integer)
  under vehicle

create table sportsCar
  (horsepower integer
   rental_age_requirement integer)
  under vehicle

create table van
  (num_passengers integer)
  under vehicle

create table offRoadVehicle
  (ground_clearance real
   driveTrain DriveTrainType)
  under vehicle

8.4

Answer:

a. FILL IN

b. Queries in SQL

i. Program:

```
select ename
from emp as e, e.ChildrenSet as c
where 'March' in
  (select birthday.month
   from c
  )
```

ii. Program:

```
select e.ename
from emp as e, e.SkillSet as s, s.ExamSet as x
where s.type = 'typing' and x.city = 'Dayton'
```
iii. Program:

```sql
select distinct s.type
from emp as e, e.SkillSet as s
```

8.5

**Answer:**
The corresponding SQL:99 schema definition is given below. Note that the derived attribute `age` has been translated into a method.

```sql
create type Name
(fist_name varchar(15),
middle_initial char,
last_name varchar(15))
create type Street
(streeet_name varchar(15),
street_number varchar(4),
apartment_number varchar(7))
create type Address
(street Street,
city varchar(15),
state varchar(15),
zip_code char(6))
create table customer
(name Name,
customer_id varchar(10),
address Address,
phones array(10) of char(7),
dob date)
method integer age()
```

The above array syntax is based on Oracle, in PostgreSQL `phones` would be declared to have type `char(7)[].`

8.6

**Answer:**

a. The schema definition is given below.

```sql
create type Employee
(person_name varchar(30),
streeet varchar(15),
city varchar(15))
create type Company
```
(company.name varchar(15),
  city varchar(15))
create table employee of Employee
create table company of Company
create type Works
  (person ref(Employee) scope employee,
   comp ref(Company) scope company,
   salary int)
create table works of Works
create type Manages
  (person ref(Employee) scope employee,
   (manager ref(Employee) scope employee)
create table manages of Manages

b. i. select comp- >name
    from works
    group by comp
    having count(person) \geq\ all(select count(person)
      from works
      group by comp)

ii. select comp- >name
    from works
    group by comp
    having sum(salary) \leq\ all(select sum(salary)
      from works
      group by comp)

iii. select comp- >name
    from works
    group by comp
    having avg(salary) > (select avg(salary)
      from works
      where comp- >company.name="First Bank Corporation")

8.7

Answer:
We do not consider the questions containing neither of the keywords because their relevance to the keywords is zero. The number of words in a question include stop words. We use the equations given in Section 31.2 to compute relevance; the log term in the equation is assumed to be to the base 2.
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>84</td>
<td>0.0170</td>
<td>0.0170</td>
<td>0.0002</td>
<td>0.0004</td>
</tr>
<tr>
<td>4</td>
<td>22</td>
<td>0.0000</td>
<td>0.0641</td>
<td>0.0000</td>
<td>0.0029</td>
</tr>
<tr>
<td>5</td>
<td>46</td>
<td>0.0310</td>
<td>0.0310</td>
<td>0.0006</td>
<td>0.0013</td>
</tr>
<tr>
<td>6</td>
<td>22</td>
<td>0.0641</td>
<td>0.0000</td>
<td>0.0029</td>
<td>0.0029</td>
</tr>
<tr>
<td>7</td>
<td>33</td>
<td>0.0430</td>
<td>0.0430</td>
<td>0.0013</td>
<td>0.0026</td>
</tr>
<tr>
<td>8</td>
<td>32</td>
<td>0.0443</td>
<td>0.1292</td>
<td>0.0013</td>
<td>0.0054</td>
</tr>
<tr>
<td>9</td>
<td>77</td>
<td>0.0000</td>
<td>0.0186</td>
<td>0.0000</td>
<td>0.0002</td>
</tr>
<tr>
<td>14</td>
<td>30</td>
<td>0.0473</td>
<td>0.0000</td>
<td>0.0015</td>
<td>0.0015</td>
</tr>
<tr>
<td>15</td>
<td>26</td>
<td>0.0544</td>
<td>0.0544</td>
<td>0.0020</td>
<td>0.0041</td>
</tr>
</tbody>
</table>

8.8 Answer: FILL

8.9 Answer: FILL