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
     renter_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:

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

8.5

Answer:

The corresponding SQL:1999 schema definition is given below. Note that the derived attribute *age* has been translated into a method.

```
create type Name
    (first_name varchar(15),
     middle_initial char,
     last_name varchar(15))
create type Street
    (street_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 Adress,
     phones  varray(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.

```
create type Employee
    (person_name varchar(30),
     street 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) ≥ all(select count(person)
                           from works
                           group by comp)
```

ii.
```
select comp->name
from works
group by comp
having sum(salary) ≤ 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.

Q#	#wo--rds	# "SQL"	#"rela--tion"	"SQL" term freq.	"relation" term freq.	"SQL" relv.	"relation" relv.	Tota relv.
1	84	1	1	0.0170	0.0170	0.0002	0.0002	0.0004
4	22	0	1	0.0000	0.0641	0.0000	0.0029	0.0029
5	46	1	1	0.0310	0.0310	0.0006	0.0006	0.0013
6	22	1	0	0.0641	0.0000	0.0029	0.0000	0.0029
7	33	1	1	0.0430	0.0430	0.0013	0.0013	0.0026
8	32	1	3	0.0443	0.1292	0.0013	0.0040	0.0054
9	77	0	1	0.0000	0.0186	0.0000	0.0002	0.0002
14	30	1	0	0.0473	0.0000	0.0015	0.0000	0.0015
15	26	1	1	0.0544	0.0544	0.0020	0.0020	0.0041

8.8

Answer:
FILL

8.9

Answer:
FILL