COIS 3400

Assignment 3

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Person:

ID	name	age	gender	occupationID	cityID
1	John	31	Male	1	3
2	Alaadin	23	Male	1	4
3	Jane	31	Female	2	4
4	Xi	26	Male	3	2

Occupation:

occupationID	occupationName
1	Software Engineer
2	Accountant
3	Business Manager
4	Professor

City:

cityID	cityName
1	Halifax
2	Toronto
3	Peterborough
4	Hamilton

a- $\Pi_{name}(\sigma_{age>25}(Person))$

b- $\sigma_{ID>3 \text{ and age } !=31}(Person)$

c- $\sigma_{Person.occupationID=Occupation.occupationID}(Person \times Occupation)$

d- $Person \bowtie Occupation \bowtie City$

e- $\Pi_{name,\ gender}\ (\sigma_{cityName= \text{“Toronto”}}\ (Person \bowtie City))$

1- Show the output for the following relational algebra expressions using the relational instances above (5 points):

A- Πname(σage>25(Person))

Person:

Name
John
Jane
Xi

B- σID>3 and age !=31(Person)

Person:

ID	name	age	gender	occupationID	cityID
4	XI	26	Male	3	2

C- σPerson.occupationID=Occupation.occupationID(Person X Occupation)

Person:

ID	name	age	gender	occupationID	cityID	occupationName
1	John	31	Male	1	3	Software Engineer
2	Alaadin	23	Male	1	4	Software Engineer
3	Jane	31	Female	2	4	Accountant
4	Xi	26	Male	3	2	Business Manager

D- Person ⋈ Occupation ⋈ City

Person:

ID	name	age	gender	occupationID	cityID	occupationName	cityName
1	John	31	Male	1	3	Software Engineer	Peterborough
2	Alaadin	23	Male	1	4	Software Engineer	Hamilton
3	Jane	31	Female	2	4	Accountant	Hamilton
4	Xi	26	Male	3	2	Business Manager	Toronto

E- Πname, gender (σcityName= “Toronto” (Person ⋈ City))

Person:

name	gender
Xi	Male

2- Write the equivalent SQL statements for the relational algebra expressions in question 1 (5 points).

A- Πname(σage>25(Person))

```
SELECT 'name'
FROM Person
WHERE (age > 25);
```

B- σID>3 and age !=31(Person)

```
SELECT Person.*, Occupation.*
FROM Person
WHERE (ID > 3) AND (age <> 31);
```

C- σPerson.occupationID=Occupation.occupationID(Person X Occupation)

```
SELECT *
FROM Person
INNER JOIN Occupation
        ON Person.occupationID = Occupation.occupdationID;
```

D- Person ⋈ Occupation ⋈ City

```
SELECT Person.*, Occupation.*, City.*
FROM Person
INNER JOIN Occupation
        ON Person.occupationID = Occupation.occupationID
INNERJOIN City
        ON Person.cityID = City.cityID;
```

E- Πname, gender (σcityName= "Toronto" (Person ⋈ City))

```
SELECT Person.name, Person.gender
FROM PERSON
INNER JOIN City
        ON Person.cityID = City.cityID
WHERE (City.cityName = "Toronto");
```

3- Briefly comment and provide a rationale as to which NF the database above is in currently (2 points).

1NF: Rows are uniquely identified

Each cell only has 1 value

Table layout is organized well

2NF: Is in 1NF

Each non-key attribute relies fully on the primary key value

3NF: Is in 2NF

No transitive dependency

No derived data

BCNF: Is in 3NF

No overlapping candidate keys

Therefore by following the checklist of rules that define each step, I can assume that the tables are in Boyce-Codd normal form as they meet every requirement.