HERITAGE INSTITUTE OF TECHNOLOGY

BTech 5th Semester Examination. 2022…… Session : 2022-2023

Discipline : Computer Science & Engineering

Paper Code: **CSEN 3101** Paper Name: **Database Management Systems**

Group - B

2. Consider the following relational database schema consisting of the four relation schemas.
[(CSEN3101.2) (Formulate/IOCQ)] (a) + (b) + (c) + (d) + (e) + (f) = 6 * 2 = 12

Passenger (pid, pname, pgender, pcity)

Agency (aid, aname, acity)

Flight (fid, fdate, time, src, dest)

Booking (pid, aid, fid, fdate)

Answer the following questions using relational algebra queries;
a) Get the complete details of all flights to New Delhi.
b) Get the details about all flights from Chennai to New Delhi.
c) Find only the flight numbers for passenger with pid 123 for flights to Chennai before 06/11/2020.
d) Find the passenger names for passengers who have bookings on at least one flight.
e) Find the passenger names for those who do not have any bookings in any flights.
f) Find the agency names for agencies that located in the same city as passenger with passenger id 123.

Ans:

a) Get the complete details of all flights to New Delhi.

$$\sigma_{destination = \text{“New Delhi”}}(flight)$$

b) Get the details about all flights from Chennai to New Delhi.

$\sigma_{src = \text{“Chennai”} \wedge dest = \text{“New Delhi”}}(flight)$

c) Find only the flight numbers for passenger with pid 123 for flights to Chennai before 06/11/2020.

$\Pi_{fid}(\sigma_{pid = 123}(booking) \quad \sigma_{dest = \text{“Chennai”} \wedge fdate < 06/11/2020}(flight))$

d) Find the passenger names for passengers who have bookings on at least one flight.

Π_{pname} (passenger booking)

e) Find the passenger names for those who do not have any bookings in any flights.

$\Pi_{pname}((\Pi_{pid}(passenger) - \Pi_{pid}(booking)) \quad passenger)$

f) Find the agency names for agencies that located in the same city as passenger with passenger id 123.

$\Pi_{aname}(agency \quad _{acity = pcity}(\sigma_{pid = 123}(passenger)))$

Group - C

5. For relation R = (L, M, N, O, P), the following dependencies hold:
M → O, NO → P, P → L and L → MN. R is decomposed into R_1 = (L, M, N, P) and R_2 = (M, O).

a) Is the above decomposition lossless-join decomposition? Explain.
b) Is the above decomposition dependency preserving? If not, list all the dependencies that are not preserved.
c) What is the highest normal form satisfied by the above decomposition
[(CSEN3101.4) (Apply /HOCQ)] **(a) + (b) + (c) = 4 + 4 + 4 =12**

Ans:

(a) **The above decomposition lossless-join decomposition, because, no spurious tuples arises from R1 and R2.**

(b) **The above decomposition is not dependency preserving. Dependencies that are not preserved are: M → O, NO → P**

(c) **2NF, because, transitive dependencies exist: P → L, L → MN within R1.**

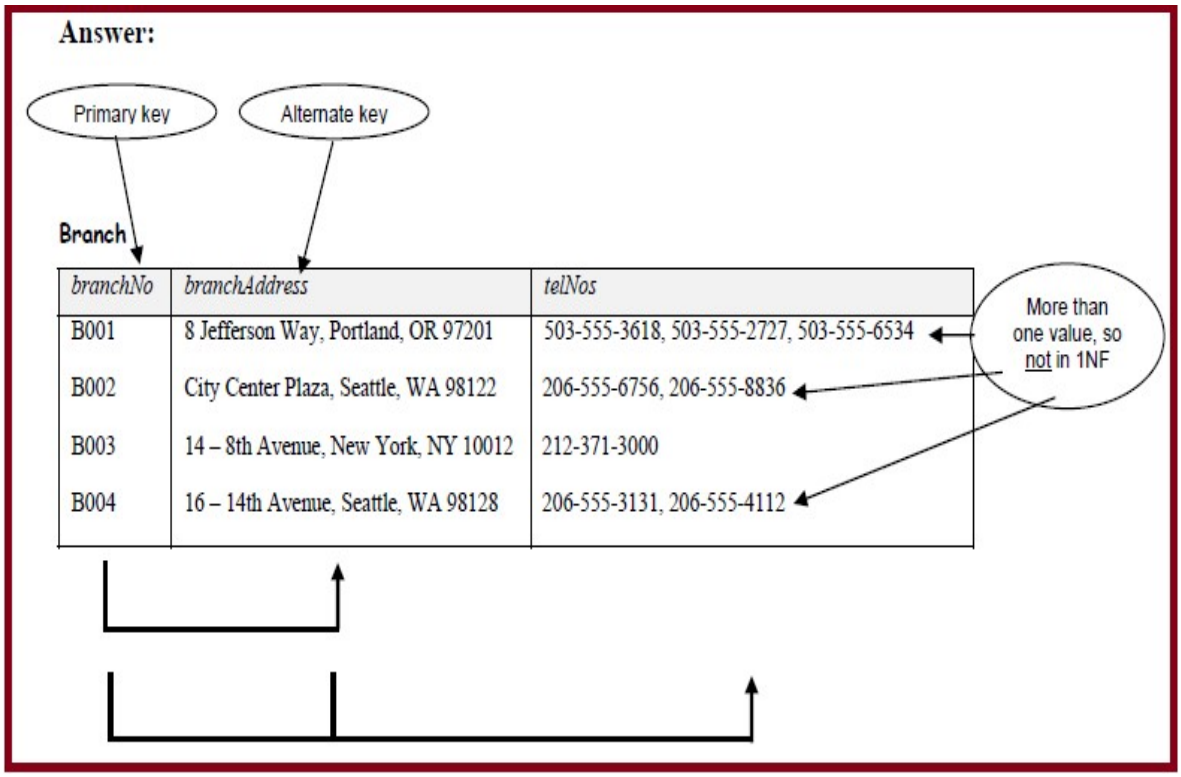
Group - D

6. Examine the table shown below:

branchNo	branchAddress	telNos
B001	8 Jefferson Way, Portland, OR 97201	503-555-3618, 503-555-2727, 503-555-6534
B002	City Center Plaza, Seattle, WA 98122	206-555-6756, 206-555-8836
B003	14-8th Avenue, New York, NY 10012	212-371-3000
B004	16-14th Avenue, Seattle, WA 98128	206-555-3131, 206-555-4112

a) Why is this table not in 1NF?
b) Describe and illustrate the process of normalizing the data shown in this table to 3NF.
c) Identify the primary, alternate and foreign keys in your 3NF relations.
[(CSEN3101.4) (Apply /HOCQ)] **(a) + (b) + (c) = 4 + 4 + 4 = 12**

Answer:



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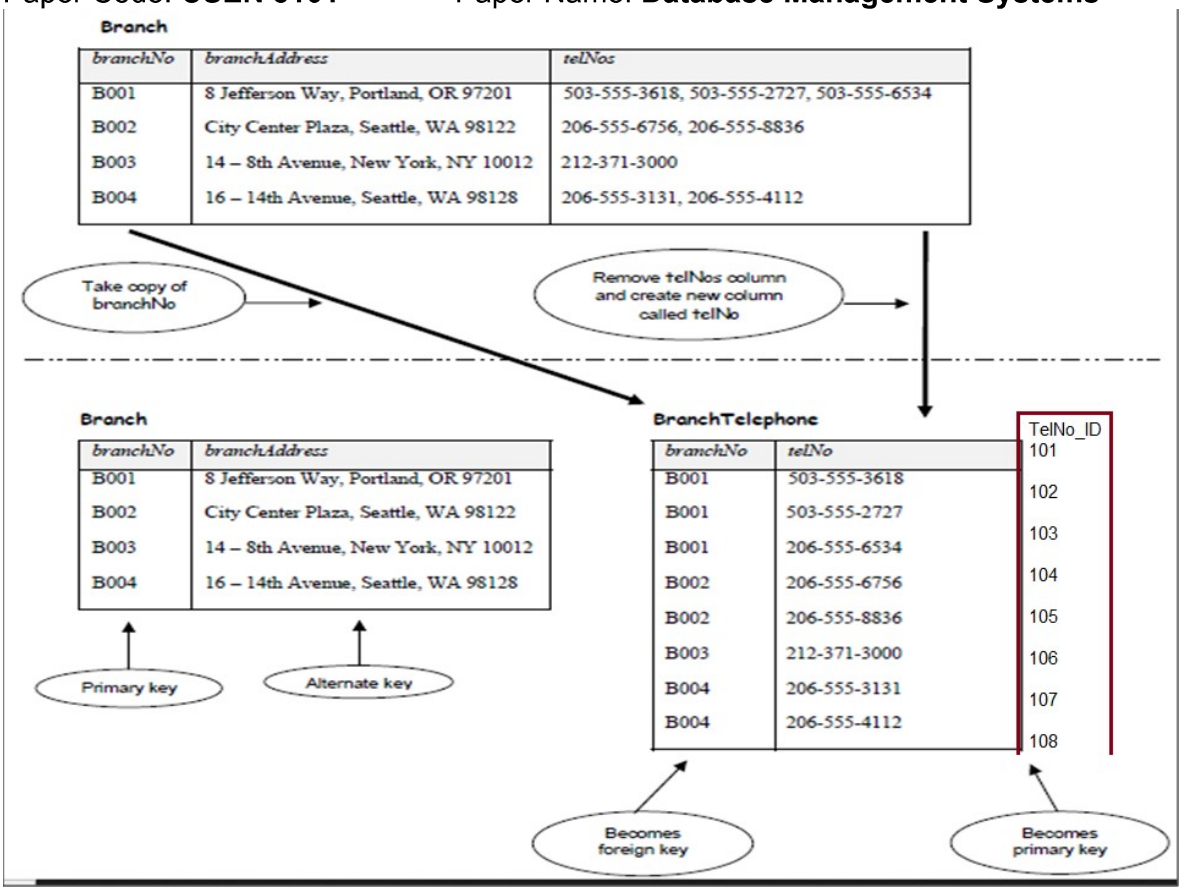

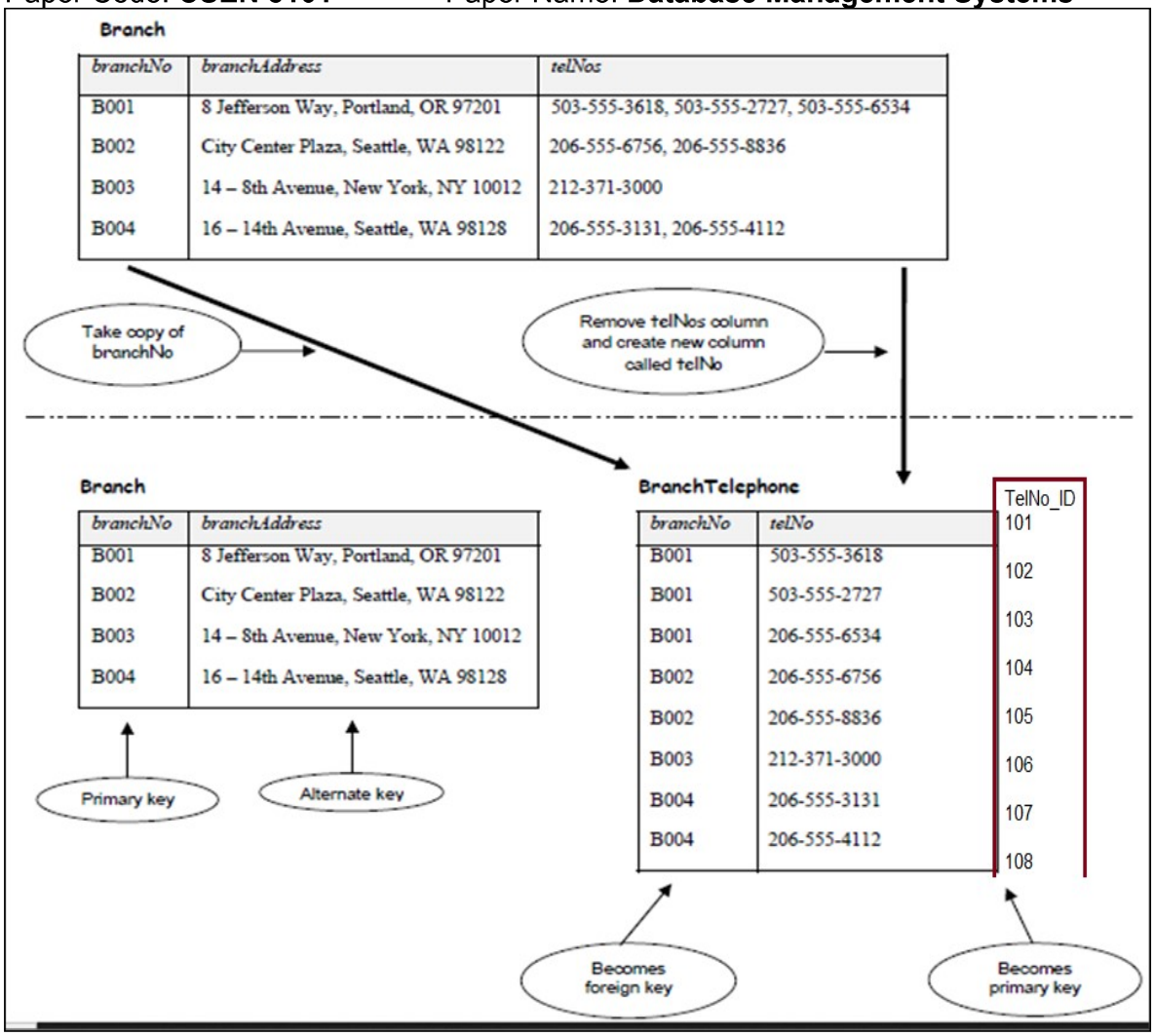
Branch
branchNo
branchAddress
telNos
B001
8 Jefferson Way, Portland, OR 97201
503-555-3618, 503-555-2727, 503-555-6534
B002
City Center Plaza, Seattle, WA 98122
206-555-6756, 206-555-8836
B003
14 – 8th Avenue, New York, NY 10012
212-371-3000
B004
16 – 14th Avenue, Seattle, WA 98128
206-555-3131, 206-555-4112
Take copy of branchNo
Remove telNos column and create new column called telNo
Branch
branchNo
branchAddress
B001
8 Jefferson Way, Portland, OR 97201
B002
City Center Plaza, Seattle, WA 98122
B003
14 – 8th Avenue, New York, NY 10012
B004
16 – 14th Avenue, Seattle, WA 98128
Primary key
Alternate key
BranchTelephone
branchNo
telNo
TelNo_ID
B001
503-555-3618
101
B001
503-555-2727
102
B001
206-555-6534
103
B002
206-555-6756
104
B002
206-555-8836
105
B003
212-371-3000
106
B004
206-555-3131
107
B004
206-555-4112
108
Becomes foreign key
Becomes primary key