Assignment 02

Database Systems CS219

Note: In case of plagiarism straight zero marks will be assigned for complete assignment. Total weightage is 5. Submission deadline is 22nd-Nov-2020.

Question 1: The SPORTICS society of FAST-NUCES is quite energetic and frequent to arrange sport events. The table shown below lists the information of players playing for their teams. The player number is unique for every team member.

Player Number	Player Name	Team	Team color	Coach No	Coach Name	Player Position	Team Captain
R-4044	Ahmed	Reapers	Green	15	Saad	6	Ayeman
K-8088	Ali	Knights	Blue	45	Taseen	3	Kumail
D-1234	Hammad	Demons	Red	55	Shehryar	5	Ali Ahmed
M-7899	Fatima	Markhors	Yellow	65	Subash	2	Zakir
G-9099	Maham	Gladiators	Black	75	Swaleh	6	Hamza
R-5066	Haziq	Reapers	Green	15	Saad	5	Ayeman

a. The table shown above is susceptible to update anomalies. Provide examples of insertion, deletion, and update anomalies.

b. Describe and illustrate the process of normalizing the table shown above to 3NF, by identifying the functional dependencies represented by the attributes. State any assumptions you make about the data shown in the table.

Question 2: Given relation R=(A,B,C,D), find if R is in 3NF or BCNF with respect to the following FDs (each alphabetic bullet point is separate FD):

a) B -> C, C -> A, C -> D
b) ABC -> D, D -> A
c) A -> C, B -> D

Question 3: Students can lease university flats and some of the details of leases held by students for places in university flats are shown below in table. A place number (placeNo) uniquely identifies each single room in all flats and is used when leasing a room to a student. BannerID is used to uniquely identify a student.

a. The table shown above is susceptible to update anomalies. Provide examples of insertion, deletion, and update anomalies.

b. Describe and illustrate the process of normalizing the table shown above to 3NF, by identifying the functional dependencies represented by the attributes. State any assumptions you make about the data shown in the table.

leaseNo	bannerID	placeNo	fName	lName	startDate	finishDate	flatNo	flatAddress
10003	B017706	78	Jane	Watt	01/09/2010	30/06/2011	F56	34 High Street, Paisley
10259	B017706	88	Jane	Watt	01/09/2011	30/06/2012	F78	111 Storrie Road, Paisley
10364	B013399	89	Tom	Jones	01/09/2011	30/06/2012	F78	111 Storrie Road, Paisley
10566	B012124	102	Karen	Black	01/09/2011	30/06/2012	F79	120 Lady Lane, Paisley
11067	B034511	88	Steven	Smith	01/09/2012	30/06/2013	F78	111 Storrie Road, Paisley
11169	B013399	78	Tom	Jones	01/09/2012	30/06/2013	F56	34 High Street, Paisley

Question 4: Consider the following database schema computer products:

Computer (maker, model, category)

Model (number, speed, ram, harddisk, price)

Maker (name, address, phone)

Where

- Maker indicates the manufacturer of the computer
- Category takes values such as "desktop", "Laptop", "server"

Express following queries in relational algebra:

a. Find all the makers who make some laptop(s)
b. Find all the makers who make at least three different desktop models
c. Find the phone numbers of all the makers who make desktops with speed = "3.2"
d. Find the makers who don't make any desktop, and do make some laptop(s)
e. Find the makers who make all models with speed faster than 3.2

Question 5: Generate the relational algebra expressions for the following queries, using the schema given below:

Branch	(branchNo, street, city, postcode)
Staff	(staffNo, fName, lName, position, sex, DOB, salary, branchNo)
PropertyForRent	(propertyNo, street, city, postcode, type, rooms, rent, ownerNo, staffNo, branchNo)
Client	(clientNo, fName, lName, telNo, prefType, maxRent, eMail)
PrivateOwner	(ownerNo, fName, lName, address, telNo, eMail, password)
Viewing	(clientNo, propertyNo, viewDate, comment)
Registration	(clientNo, branchNo, staffNo, dateJoined)

a. How many properties cost more than £350 per month to rent?
b. Identify all clients who have viewed all properties with three rooms.
c. List the names and comments of all clients who have viewed a property for rent.
d. List all cities where there is either a branch office or a property for rent situated.
e. List all cities where there is a branch office but no properties for rent.