

Database Systems

Assignment #1

Spring 2018

Due Date: Before the start of the class (7nd February, 2018)

Instructions:

- Use proper assignment papers for solving your assignment questions. Assignment done on diary pages, register pages, rough pages will not be credited.
- Do not copy the work of your peers. In case cheating is detected, then your case will be referred to DC.

Question 1: [10 marks]

An emerging mobile company wants to develop an online database of mobile apps (applications) available for download to its users. You can assume that they want to develop a simpler version of Android PlayStore or iOS AppStore.

You are given the following relational database schema

App(app-id, app-name, developer-id, cost, category)

User(user-id, user-name, country)

Developer(developer-id, developer-name, age, country)

Downloads(app-id, user-id, rating, review)

For each App they record the app id, app name, the app developer's id, cost of the app (some app may be free of cost) and category. The category can be games, productivity, kids, entertainment etc. The system maintains the download details such as which app is downloaded by which particular user. In addition to this it also records the rating (on a scale of 1-5) and review (if any) given by each user to a particular app.

- Identify the Domain of each attribute**
- Identify the primary key of each relation.**
- Identify the foreign keys and referential integrity constraints**
- Populate the relations with a few sample tuples and give an example of an insertion in the Downloads relations that *violates* the referential integrity constraints and of another insertion that does not.**

Question 2: [10 marks]

Consider the following relational database for the Baseball League. It keeps track of teams in the league, coaches and players on the teams, work experience of the coaches and which players have played on which teams.

Note the following facts about this environment:

- The database keeps track of the history of all the teams that each player has played on and all the players who have played on each team.
- The database only keeps track of the current team that a coach works for.
- Team number, team name, and player number are each unique attribute across the league.
- Coach name is unique only within a team (and we assume that a team cannot have two coaches of the same name).
- In the Affiliation table, the Years attribute indicates the number of years that a player played on a team; the batting average is for the years that a player played on a team.

Team (TeamNum, TeamName, City, Manager)
Coach (TeamNum, CoachName, Address)
WorkExperience (TeamNum, CoachName, ExperienceType, YearsExperience)
Player (PlayerNum, PlayerName, Age)
Affiliation (PlayerNum, TeamNum, Years, BattingAvg)

- a) Identify the Domain of each attribute
- b) Identify the primary key of each relation.
- c) Identify the foreign keys and referential integrity constraints.

Question 3: [10 marks] NUCES BOOKSHOP

We want you to automate the NUCES Lahore BOOKSHOP. It would be great if you can design the database system for the bookshop that can keep track of the books required by each course offered in different departments in NUCES, Lahore. You need to maintain the basic details about the books like title, first author, publisher and edition. In addition to this you need to keep details regarding the number of copies of each book purchased and the number of books sold in each semester. You can assume that the bookshop has the information regarding the number of students enrolled in each course, so they can figure out how many books they must purchase. Note bookshop don't need information about the course section since we assume that all sections of a course follow the same books. However, a course may need more than one book.

Think about the details that the bookshop need to maintain for smooth operations and answer the following questions:

- a) Does it need 2-tier architecture or 3-tier architecture for DBMS? Justify.
- b) What do you think are the main objects (entities) that need to be represented in the database?
- c) What relationships do you think exist between these main objects (entities)?
- d) For each of the objects, what details do you think need to be held in the database (attributes)? Also identify keys and foreign keys.
- e) What **queries** do you think are required? List just five queries.
An example of a query would be: List all the books purchased in spring 2005.