17IDCS006

The LNM Institute of Technology, Jaipur

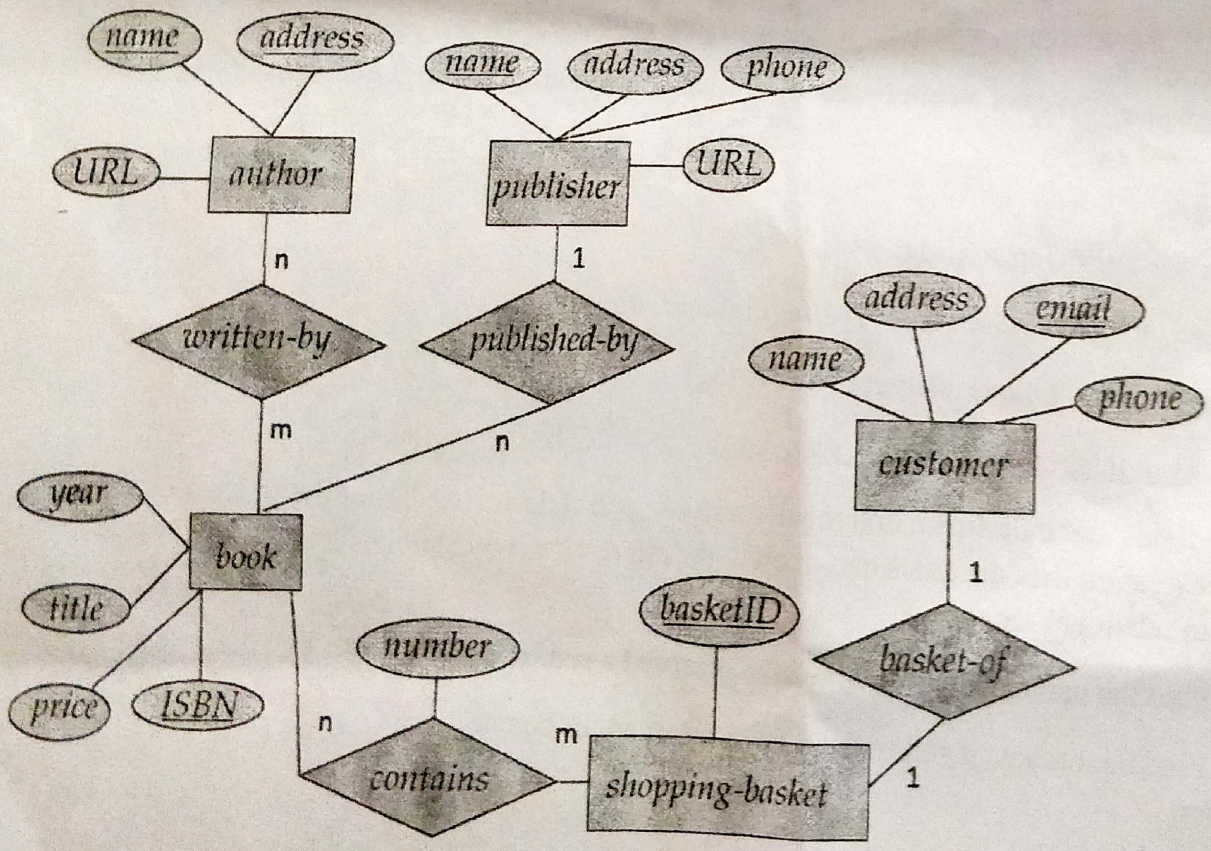
Mid Term Exam II Year Odd Sem (2018-2019)

MM: 30 **IDBMS** **Time: 90 min**

Part B (5 marks each)

1. Draw the ER diagram for the following application that models football teams, the games they play, and the players in each team. In the design, we want to capture the following:
   - We have a set of teams, each team has an ID (unique identifier), name, and to which city this team belongs.
   - Each team has many players, and each player belongs to one team. Each player has a number (unique identifier), name, DoB, start year, and shirt number that he uses.
   - Teams play matches. For each match we need to keep track of the following: The date on which the game is played, the stadium in which the game is played, the final result of the match, the players participated in the match.
   - For each player, how many goals he scored, whether or not he took yellow card, and whether or not he took red card.
   - During the match, one player may substitute another player. We want to capture this substitution and the time at which it took place.
   - Each match has exactly three referees. For each referee we have an ID (unique identifier), name, DoB, years of experience. One referee is the main referee and the other two are assistant referee.

2. Construct the tables for the entities and relations separately in the following ER diagram. Also identify the primary keys and foreign keys.



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3. Consider the relation R, which has attributes that hold schedules of courses and sections at a university; R = {A, B, C, D, E, F, G, H, I, J, K}. Suppose that the following set of Fds hold on R: {A->CDE, ABGH->IJKF, JIGH->FAB}

   Determine candidate keys of R. Decompose R into 2NF and then 3NF relations by considering any one candidate key as a primary key.

4. Consider the relation DISK_DRIVE(Serial_number, Manufacturer, Model, Batch, Capacity, Retailer). Each tuple in the relation DISK_DRIVE contains information about a disk drive with a unique Serial_number, made by a manufacturer, with a particular model number, released in a certain batch, which has certain storage capacity and is sold by a certain retailer. For example, the tuple Disk_drive('112233', 'Dell', 'DW-316', '56789', 500, 'TechInd') specifies that Dell made a disk drive with serial number 112233 and model number DW-316, released in batch 56789; it is 500GB and sold by TechInd.

   Write each of the following dependencies as an FD:

   a. The manufacturer and serial number uniquely identifies a drive.

   b. A model number is registered by a manufacturer and therefore can't be used by another manufacturer.

   c. All disk drives in a particular batch are the same model.

   d. All disk drives of a certain model of a particular manufacturer have exactly the same capacity.

5. Consider the following schema:

   Sailors(*sid*: integer, *sname*: string, *rating*: integer, *age*: real)

   Boats(*bid*: integer, *bname*: string, *color*: string)

   Reserves(*sid*: integer, *bid*: integer, *day*: date)

   The key fields are underlined, and the domain of each field is listed after the field name. The Reserves relation lists the dates on which boats are reserved by sailors. Write the following queries in relational algebra.

   a. Find the names of sailor who have reserved a red or a green boat.

   b. Find the names of sailors who have reserved all boats.