# Assignment 1

1. For each of the following statements, write True or False as appropriate. [5 X 1 = 5 points]

a. A conceptual schema describes the details of the physical storage structures.

b. The database schema includes descriptions of the database structure, data types, and constraints.

c. Physical Data Independence is the capacity to change the conceptual schema without having to change the external schema.

d. A database system includes both DBMS software and the data.

e. SQL stands for Standard Query Language.

2. Describe two differences between the database schema and the database state. [5 points]

3. Describe three advantages of the Database approach of managing data over a File-based approach. [3 points]

4. The Three-Schema Architecture defines DBMS schemas at three levels. Briefly describe each of these three schemas. Draw a diagram illustrating the Three-Schema Architecture. [7 points]

5. Structured Query Language is divided in 2 parts -DDL and DML. Explain what is DDL and what is DML. Suppose you have to execute the tasks below using Structured Query Language, state which of the tasks below will be executed using DDL and which will use DML. [2 + 8 = 10 points]

a. Create a table name Students with 6 columns- id, name, cgpa, department, email, age
b. Change the name of the id column to student_id
c. Update the cgpa of the Student whose ID is 210933 from 3.9 to 3.92
d. The data type of department was made int by mistake, change it to char(3)
e. Retrieve the information of all students with cgpa greater than 3.5
f. Insert the information of a new student named "Sharmin Anam"
g. Delete the information of a student with ID 201892
h. Delete the column "age"

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# Assignment 02

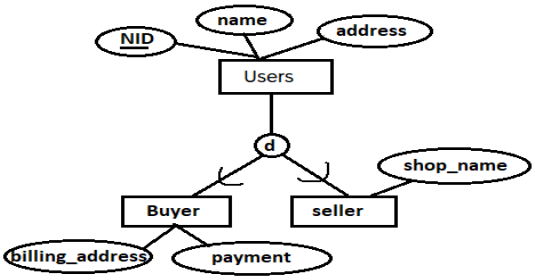
**Assignment 02**

**Question 1 [2 point]**


**Given the EER diagram above which of the statements below are certainly true [Select all that apply]:**

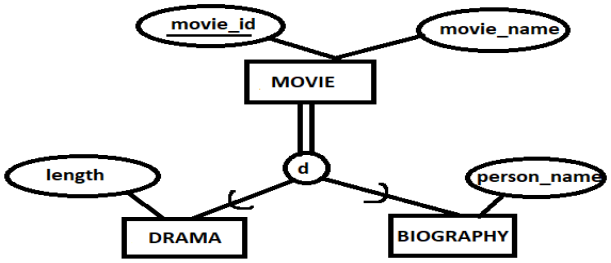
1. Users can only be Buyer or Seller, but not both
2. All users must be either Buyer or Seller
3. Some users can be Buyer or Seller or both
4. Some users may be neither Buyer nor Seller
5. All users must be both Buyer and Seller

## Question 2 [2 points]




The above EER diagram has "partial" specialization/generalization. Explain what partial means and state how can we know it is "partial" by looking at the EER diagram.

## Question 3 [2 points]




Using the above EER diagram explain what does "d" represent in the diagram.

## Question 4 [4 points]

Explain what you mean by generalization [2 points]. There are two entities "Batsman" and "Bowler". Batsman has player_id (unique), name, birthdate,

max_runs attributes. Bowler has player_id (unique), name, birthdate attributes. You should generalize the two entities into a new entity called "Player". Show the EER after generalization [2 points]

### Question 5 [10 points]

BRACU Film club is creating a database to keep track of their members and events. You have to design an EER diagram according to the requirements given below:

1. Members in the club have name, student_id (unique), birthdate, semester, department and phone number stored. Birthdates have year, month, day [1 point]
2. Members can be categorized into President, Director, Secretary or Executive roles. One member can belong to only one role. Presidents have a start_date. Executives may have multiple skills. Members must have one of the roles mentioned above. [2 points]
3. Each member must be assigned to a single department. The departments have department_id (unique), name and description. [2 points]
4. The club has many Events. The Event_Date (Unique), name, budget is recorded. [1 points]
5. Events have many Activities. The Activities have only the following attributes: name, budget_percentage and priority_level. Name of activity is a partial key. [2 points]
6. Some members are assigned to different activities. The task_description of each member for each activity is also recorded [ 2 points]

Draw an EER diagram that represents the information above.

### Question 6 [10 points]

Design an EER Diagram for a hotel management system. You have to assume all entities, attributes and relationships. No need to write any assumptions as long as the diagram is clear and realistic. Your diagram should fulfil the following conditions

1. There should be at least one overlapping-partial specialization. [2 points]
2. There should be at least 5 entities [1 point]
3. There should be at least one 1:M and one M:N relationship [2 points]
4. There should be at least one composite attribute and 1 multivalued attribute[2 points]
5. There should be at least one recursive relationship [1 point]

Your EER needs to be logical, complete and should reflect a real world scenario [2 points]

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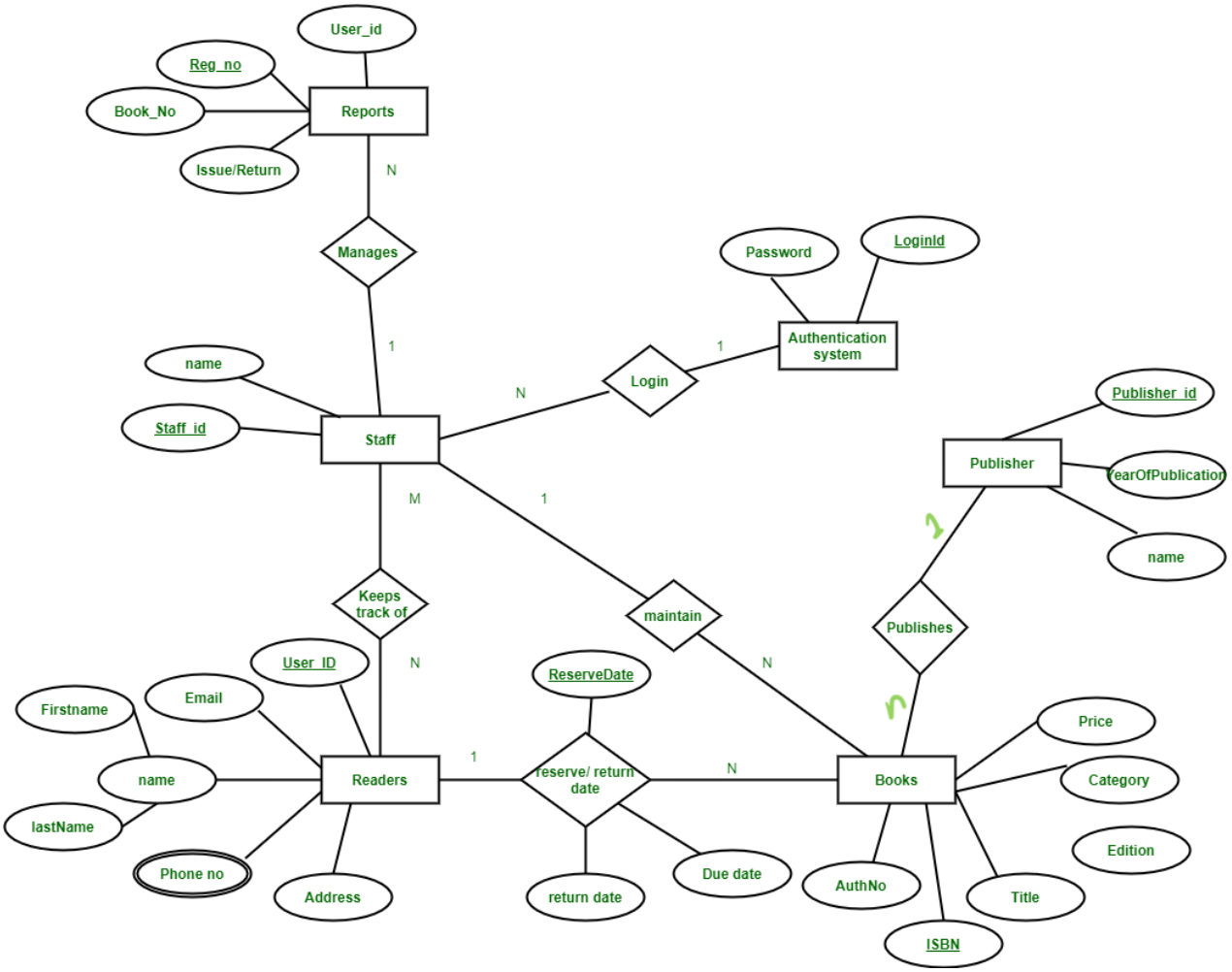
# Assignment 03

**Make sure you check the Note about Foreign Keys HERE or review the lecture slides properly before submitting.**

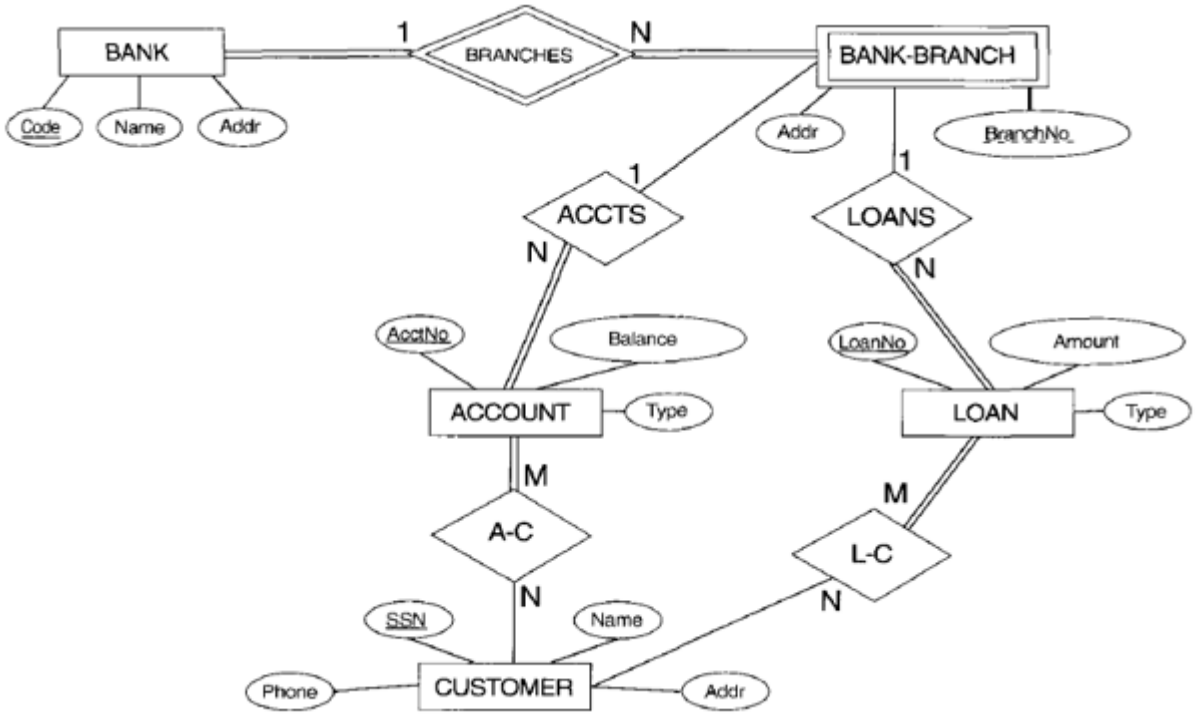
**Assignment 03**

**Question 1 [12 points]**



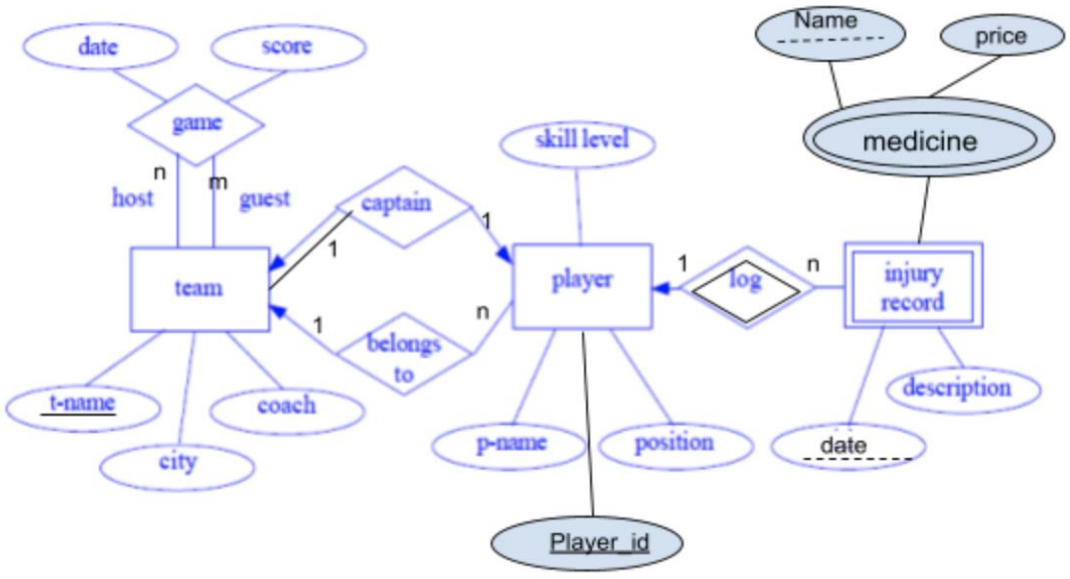

Given the ER diagram above, draw the corresponding Schema.

**Question 2[10 points]**




**Given the ER diagram above,** draw the corresponding Schema**.**

**Question 3 [8 points]**




**Given the ER diagram above,** draw the corresponding Schema**.**

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# Assignment 04

## Assignment 04

**Question 1 [5 X 2 =10 points]**

| A | B | C | D |
|---|---|---|---|
| 1 | 20 | M | 101 |
| 2 | 21 | N | 102 |
| 3 | 22 | O | 103 |
| 1 | 21 | M | 104 |
| 3 | 22 | O | 101 |

Find out which of the following dependencies are valid or not. For each dependency, briefly write the reasons.

1. A -> BD
2. A -> C
3. AB -> D
4. D -> ABC
5. BC -> A

**Question 2 [10 points]**

A relation R is given which is R(A,B,C,D,E). It has the following functional dependencies:
AB-> C, C->E and B -> D.
Answer the following based on this information.

1. Find all the candidate keys and explain your answer [2 points]
2. Which normal form does this relation satisfy? Explain your answer. [3 points]
3. Decompose it until 3NF step by step. [5 points]

**Question 3 [10 points]**

Consider the following relation:
Computer_Repair(Comp_ID, Engineer_ID, Customer_name, Engineer_Name, Date_Assigned, Date_Repaired, Issue, Priority_Level, Service_Charge, Commission_Percentage, Total_Repairs)
The primary key of the relation is underlined
The relation has the following additional functional dependencies:
FD1: Engineer_ID→ Engineer_Name, Total_Repairs, Commission_Percentage
FD2: Comp_ID → Customer_name, Issue, Priority_Level, Service_Charge
FD3: Priority_Level → Service_Charge
FD4: Total_Repairs → Commission_Percentage

1. Give reasons to explain if this is in 1NF or not. If not, decompose it to 1NF. [2 points]

2. Give reasons to explain if this is in 2NF or not. If not, decompose it to 2NF. [4 points]
3. Give reasons to explain if this is in 3NF or not. If not, decompose it to 3NF. [4 points]