Assignment - 1

Soln-1) ER Model for University database application (DBMS).

Step-1) Identify the Entity Sets

a) Department b) Course c) Student
d) Instructor

Step-2) Identify the attributes for the given entities

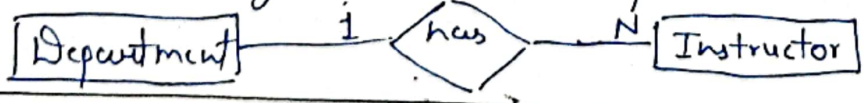
a) Department :- Dep Name, location
b) Course :- Course No, name, Duration, & prerequisite.
c) Instructor :- Name, telephone no, room no.
d) Student :- Student ID, Name, D.O.B, Email, contact no.

Step-3) Relational & Constraints.

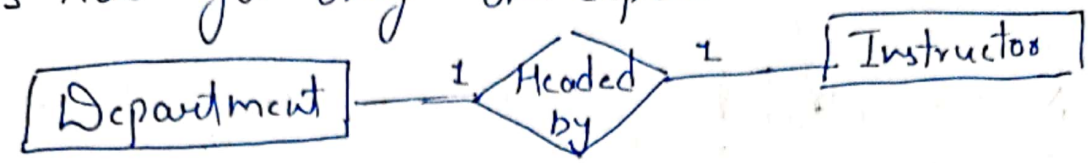
a) The department offers multiple courses & each course is associated with 1 department.

b) One course is enrolled by multiple students and one student can opt for multiple course.

c) One department has multiple instructor & one instructor belongs to one department

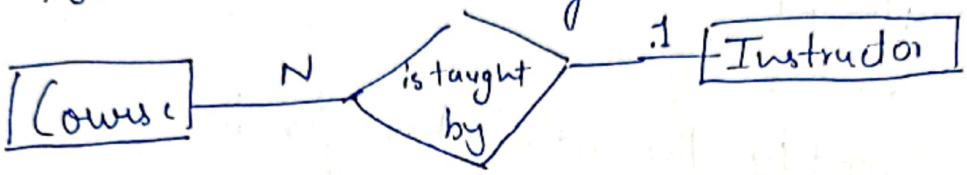


d) Each department has one "HOD" & one instructor is HOD for only one department.

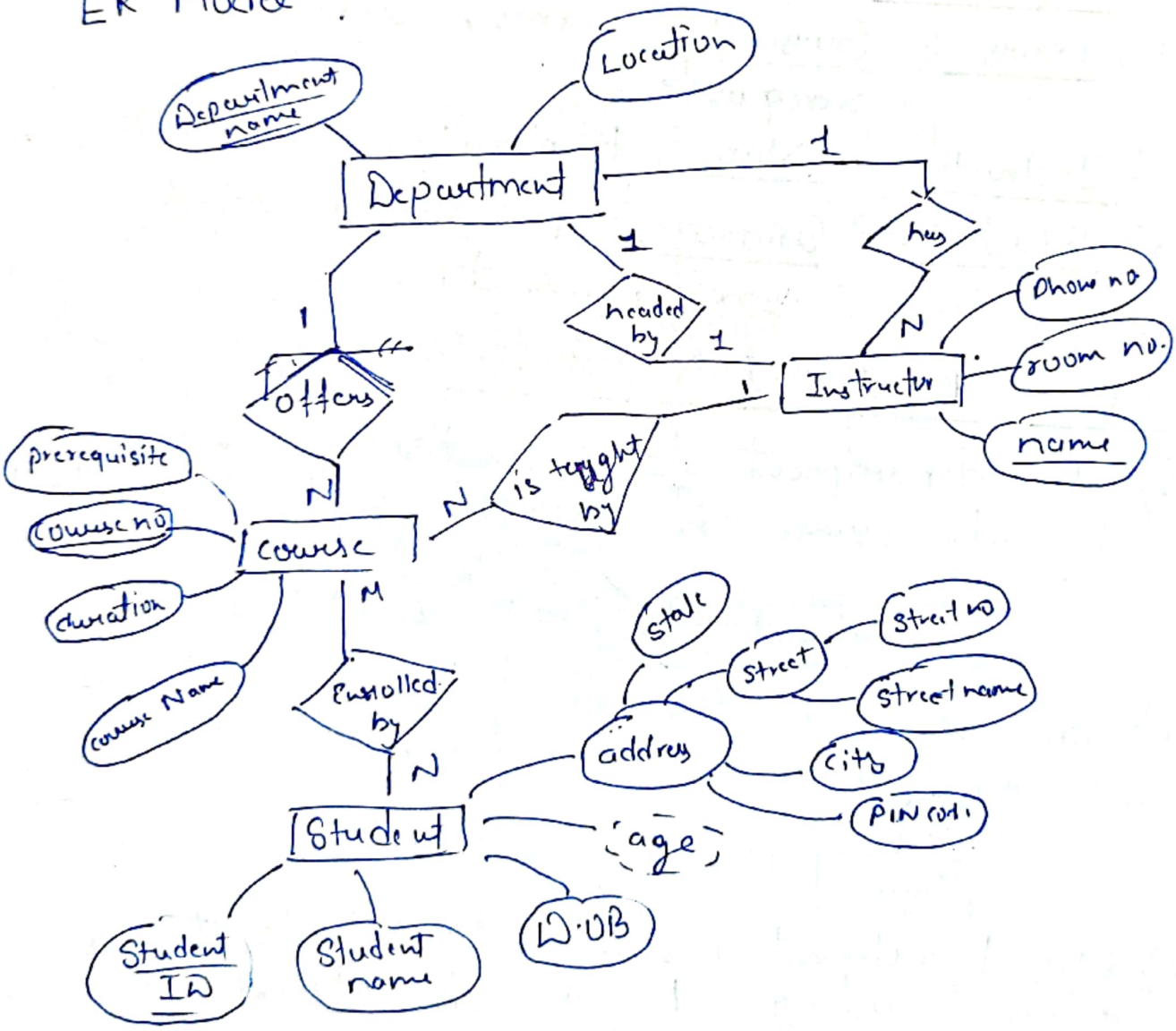


c) ~~One~~ instructor \ 1~

c) One course is taught by only one instructor. but one instructor teaches many course



ER Model



Answer-2)

1) Database Administrator (DBA):-

- Database Design:- Design & structuring database to meet application requirements.
- Performance Tuning:- Monitoring & optimizing database performance.
- Security Management:- Implementing security measures to protect data.
- Backup & Recovery:- Ensuring data is backed up & can be restored in case of failure.
- User Management:- Managing user access & permissions.
- Upgrade & Maintenance:- Performing regular updates & maintenance on the database system.
- Troubleshooting:- Diagnosing & resolve database-related issues.

2) Application Programmers.

- Development:- Writing code to create applications that interact with database.
- Database Interaction:- Implementing queries to retrieve & manipulate data.
- Application Logic:- Designing the business logic of applications, ensuring they function as intended.
- Testing:- Conducting test to ensure applications are working correctly with the database.

3) Sophisticated Users.

- Data Analysis:- Using advance tools to analyze & interpret data for decision-making.
- Custom Queries:- Writing complex SQL queries to extract specific information from the database.
- Reporting:- Generating detailed report for stakeholders.
- Data Manipulation:- Performing advanced data manipulation & transformation tasks.
- Collaboration:- Working closely with DBAs & application programmers to refine data requirements.

4) End Users.

- Data Entry:- Inputing data into applications that interact with the database.
- Basic Queries:- Running simple queries or using interfaces to retrieve information
- Reporting:- Using built-in-reporting tools to generate basic ~~oper~~ reports.
- Feedback:- Providing feedback on application functionality & usability.
- Daily task:- Utilizing application for day to day business operations without needing to understand the underlying structure.

Answer-3)

a) Primary Key
- Uniquely identifies each record in a table.
- Can't contain Null values
- Only one primary Key is allowed per table.

b) Super Key.
- It can consist of one or more attributes that uniquely identify.
- May contain additional attributes that are not necessary for uniqueness.
- There can be multiple super Key for a table

c) Candidate Key.
- A minimal super Key, meaning it has no unnecessary attributes; if any attribute is removed, it will no longer uniquely identify a record.
- There can be multiple candate Key in a table, & one of them is chosen as the primary Key.

e.g. Super Key => {Student ID}, {Email}, {Student ID, Email} {Student ID, Name}, {Email, Name} etc.

Candidate Key => {Student ID} {Email}

Primary Key => {Student ID}

Answer-4) DBMS offer several key characteristics that distinguish them from traditional file processing system.

a) Data Integrity & Consistency.

- DBMS:- Enforces data integrity (eg primary key constraints, foreign key constraints) to ensure data consistency.
- File processing:- Typically lacks built-in integrity constraints., leading to potential data inconsistencies.

b) Data Redundancy & Sharing:-

- DBMS:- Minimize data redundancy through normalization. & supports data sharing across multiple applications.
- File processing:- Often leads to data duplication, as each application may maintain its own files.

c) Data Security:-

- DBMS:- Provides ~~robust~~ robust security features ~~through~~, including user authentication, access control, & encryption.
- File processing:- Usually has limited security measures. often relying on file system level permission.

d) Data Abstraction & Independence

- DBMS:- Offers levels of data abstraction, allowing changes in the database structure without affecting applications (logical & physical data independence)

- File processing: Changes to file structures often require significant modifications to applications.

5) Mult-user Access.

- DBMS:- Supports concurrent access by multipk users, with mechanisms to handle conflicts & maintain data integrity.
- File processing :- Concurrent access can lead to data corruption or inconsistencies.

6) Complex Queries:-

- DBMS:- Provide powerful querying capabilities to perform complex data retrieval & manipulation.
- File processing:- Typically relies on simpler, often less flexible, data access methods.

7) Backup & Recovery:-

- DBMS:- Includes automated backup & recovery mechanism to protect against data loss.
- File processing:- Backup processes are often manual & less systematic, making recovery more difficult.

Answer-5) In relational database model, cardinality refers to the numerical relationship b/w entities. Their types are :-

a) One to One (1:1) :- In One to One relationship, a single record in One table is associated with a single record in another table.
E.g. Person & Passport. (A person can have only one passport, & each passport is assigned to only one person.

b) One to Many :- In One to many relationship, a (1:N) single record in one table can be associated with multiple records in another table. eg Author & Book (An author can write multiple books, but each book is written by only one author).

c) Many-to-One (N:1) :- Many records in one table relate to a single record in another table.
e.g. Employee & Department (Many Employee can belong to one department)

4) Many to Many (M:N) :- Multiple records in one table can relate to multiple records in another table.
e.g. Student & Course. (Student can enroll in multiple course & each course can have multiple students.

Answer-6)

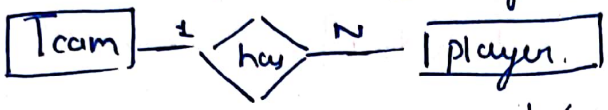
Step-1) Identify Entity Set
a) Team b) Player c) Injury Records
d) Game

Step-2) Identify attributes of Entity.
a) Team => Team ID, Name, City, Coach, Captain.
b) Player => Player ID, Name, Position, Skill-level.
c) Injury Record => Injury ID, Date, Description, Player ID (Foreign Key).

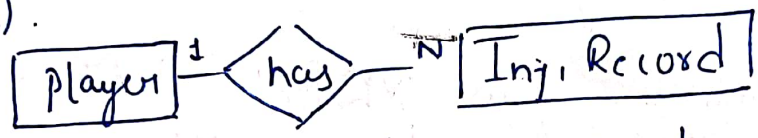
4) Game => Game ID, Date, Score, Host Team ID (F.K) & Guest Team ID (F.K).

Step-3) Relationships.

1) Team has player (Team has many player. but a player belongs to only one team)

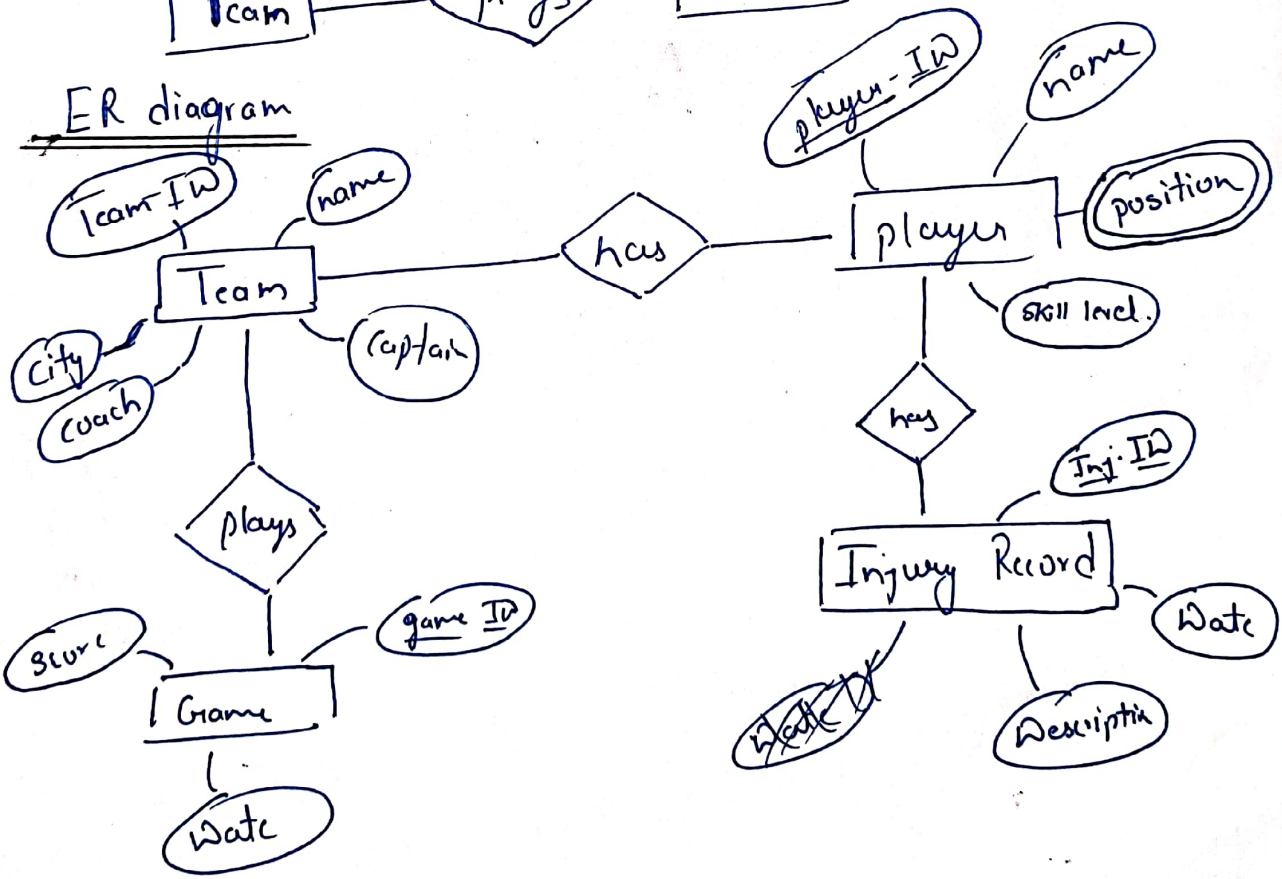


2) Player has injury record (A player can have many injury records but each injury record belongs to one player).

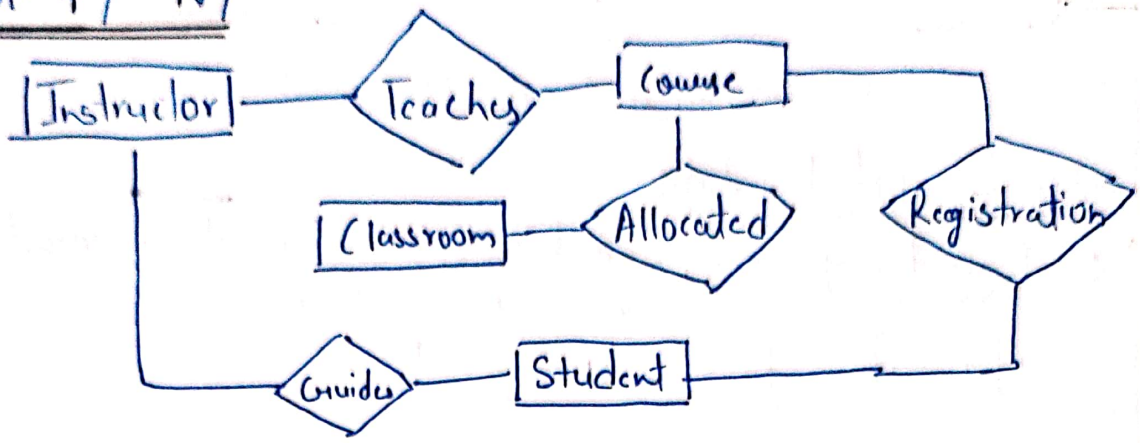


3) Team plays Game (A game involves two teams & each team can play many games)

ER diagram



Answer-7) iv)



Answer-8) (ii) VWXZ, does not contain Y and cannot uniquely identify the record without Y

Answer-9) Minimum four RDBMS table required. as their are four entity.

Answer-10) The primary key for the Enrollment table is: (Roll no, Course ID).