



GALGOTIAS
UNIVERSITY

**School of Computing
Science and Engineering**

Program: B.Sc.

Course Code: BSCS2312

Course Name: Database Management
System

Vision

To be known globally as a premier department of Computer Science and Engineering for value-based education, multidisciplinary research and innovation.

Mission

- ❑ **M1:** Developing a strong foundation in fundamentals of computing science with responsiveness towards emerging technologies.
- ❑ **M2:** Establishing state-of-the-art facilities and adopt education 4.0 practices to analyze, develop, test and deploy sustainable ethical IT solutions by involving multiple stakeholders.
- ❑ **M3:** Establishing Centers of Excellence for multidisciplinary collaborative research in association with industry and academia.

Course Outcomes (COs)

CO Number	Title
CO1	Understand the basic concepts, modeling techniques and architecture of DBMS (K2).
CO2	Apply the concept of ER Model and SQL programming using DDL and DML commands (K3).
CO3	Able to store and analyze data into normalized format. (K4).
CO4	Analyze the transaction processing concept and recovery methods in database (K4)
CO5	Examine the concept of concurrency control techniques in database (K4).
CO6	List out the various contemporary research areas and database tools (K2).

Course Prerequisites

- Knowledge of Mathematics**
- Query Languages**

Syllabus

Unit 2 – ER Modeling & SQL

(10 hours)

- ER Model Concepts, Notation for ER diagram
- Mapping Constraints
- Keys, Concepts of Super Key, Candidate Key, Primary Key
- Generalization- Aggregation
- Reduction of an ER Diagrams to Tables, Extended ER Model
- Relational Algebra
- Introduction to SQL, DDL, DML, Basic Queries, Complex SQL Queries, Views

Recommended Books

Text books

- ❑ Abraham Silberschatz, Henry F. Korth and S. Sudarshan- “Database System Concepts”, Fourth Edition, McGraw-Hill, 2002.

Reference Book

- ❑ Ramez Elmasri and Shamkant B. Navathe, “Fundamental Database Systems”, Third Edition, Pearson Education, 2003.
- ❑ Raghu Ramakrishnan, “Database Management System”, Tata McGraw- Hill Publishing Company, 2003.
- ❑ Hector Garcia–Molina, Jeffrey D.Ullman and Jennifer Widom- “Database System Implementation”- Pearson Education- 2000
- ❑ Peter Rob and Corlos Coronel- “Database System, Design, Implementation and Management”, Thompson Learning Course Technology- Fifth edition, 2003

Additional online materials

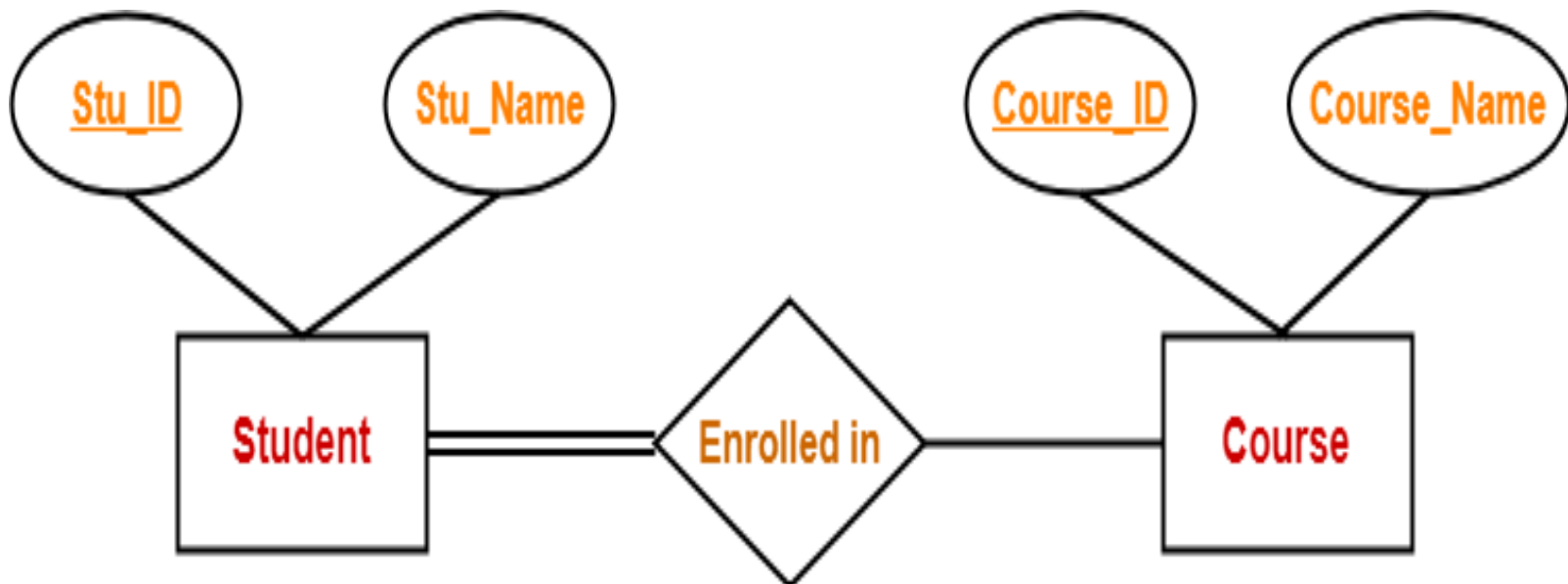
- ❑ Coursera - <https://www.coursera.org/learn/database-management>
- ❑ NPTEL- <https://nptel.ac.in/courses/106/105/106105175/>
- ❑ <https://www.coursera.org/learn/research-methods>
- ❑ <https://www.coursera.org/browse/physical-science-and-engineering/research-methods>

Strong Entity Set

- Two strong entity sets “Student” and “Course” are related to each other.
- Student ID and Student name are the attributes of entity set “Student”.
- Student ID is the primary key using which any student can be identified uniquely.
- Course ID and Course name are the attributes of entity set “Course”.
- Course ID is the primary key using which any course can be identified uniquely.
- Double line between Student and relationship set signifies total participation.
- It suggests that each student must be enrolled in at least one course.
- Single line between Course and relationship set signifies partial participation.
- It suggests that there might exist some courses for which no enrollments are made.

Strong Entity Set

- ❑ A strong entity set is an entity set that contains sufficient attributes to uniquely identify all its entities.
- ❑ In other words, a primary key exists for a strong entity set.
- ❑ Primary key of a strong entity set is represented by underlining it.



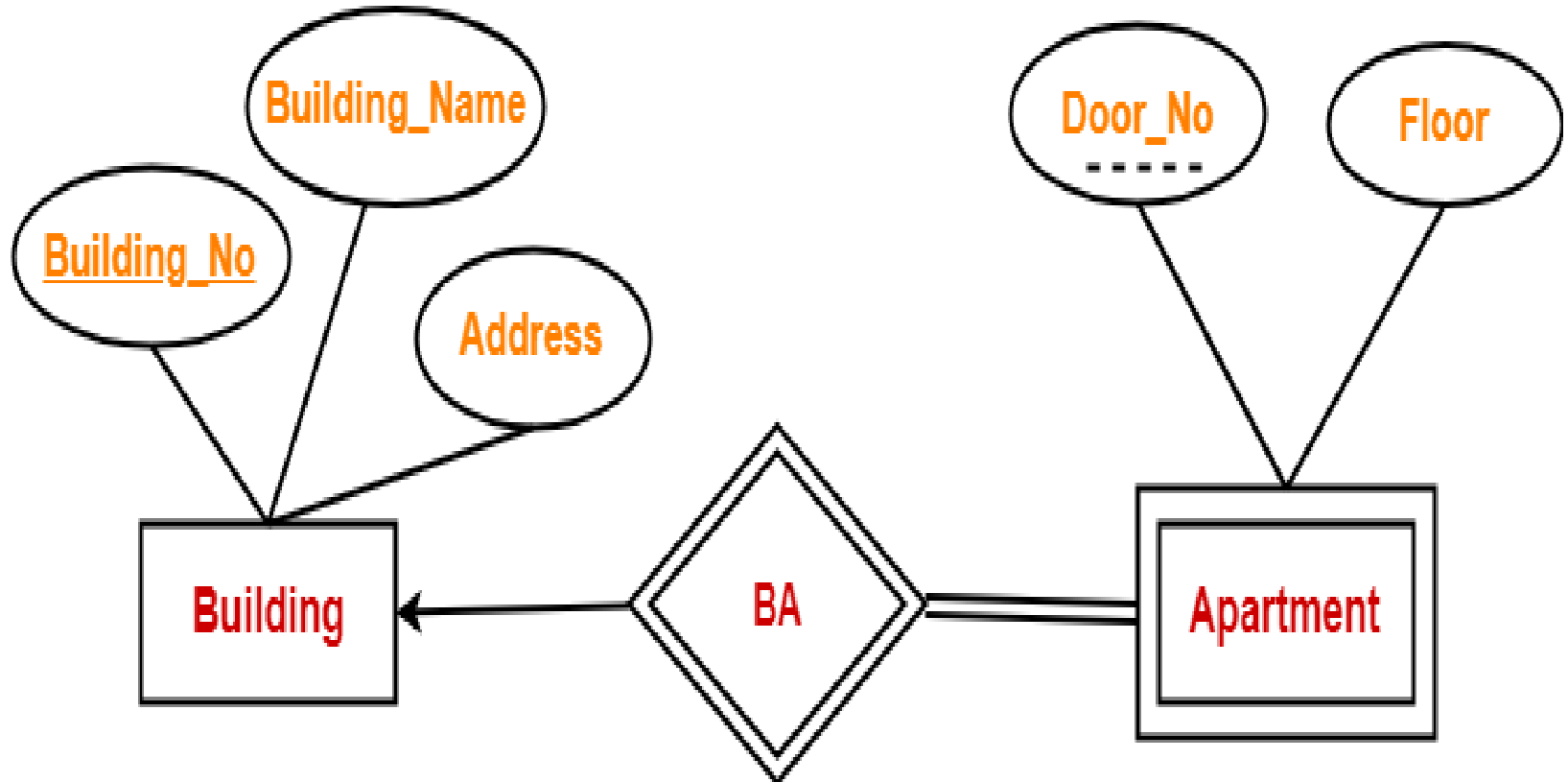
Weak Entity Set

- ❑ A weak entity set is an entity set that does not contain sufficient attributes to uniquely identify its entities.
- ❑ In other words, a primary key does not exist for a weak entity set.
- ❑ However, it contains a partial key called as a discriminator.
- ❑ Discriminator can identify a group of entities from the entity set.
- ❑ Discriminator is represented by underlining with a dashed line

Primary key of weak entity set

= Its own discriminator + Primary key of strong entity set

Weak Entity Set



Weak Entity Set

- One strong entity set “Building” and one weak entity set “Apartment” are related to each other.
- Strong entity set “Building” has building number as its primary key.
- Door number is the discriminator of the weak entity set “Apartment”.
- This is because door number alone can not identify an apartment uniquely as there may be several other buildings having the same door number.
- Double line between Apartment and relationship set signifies total participation.
- It suggests that each apartment must be present in at least one building.
- Single line between Building and relationship set signifies partial participation.
- It suggests that there might exist some buildings which has no apartment.
- Primary key of Apartment = Primary key of Building + Its own discriminator**

Entity Relationship (ER) Diagram

- ❑ Major components of ER diagram is Entity, Attribute and Relationship.

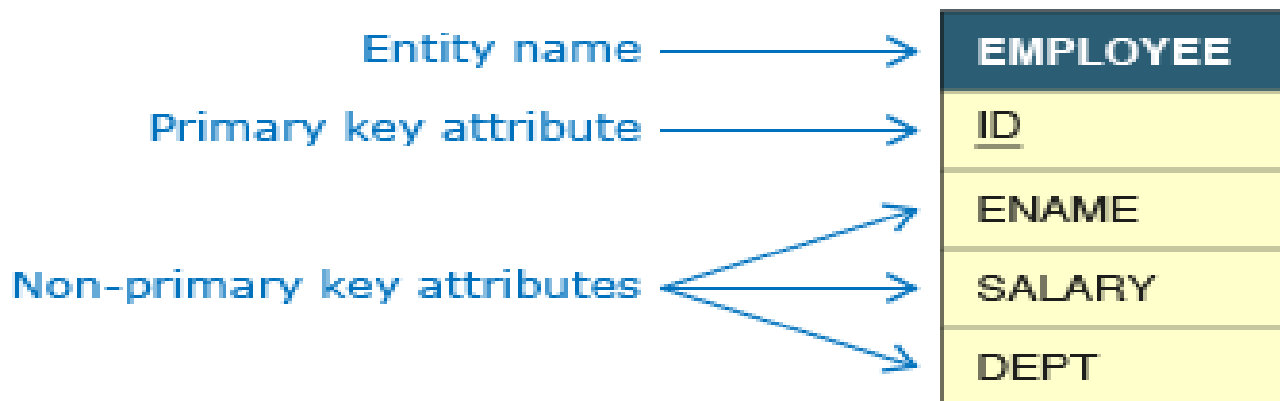
Entity/Entity Type

- ❑ Any real world object is called as an Entity.
- ❑ A name/label assigned to items/objects that exist in an environment and that have similar properties. It could be person, place or even concepts.
- ❑ Example includes Furniture, Teaching Aids, Electronic equipment.
- ❑ For example, in a school database, students, teachers, classes, and courses offered can be considered as entities. All these entities have some attributes or properties that give them their identity.
- ❑ An entity set is a collection of similar types of entities. An entity set may contain entities with attribute sharing similar values. For example, a Students set may contain all the students of a school; likewise a Teachers set may contain all the teachers of a school from all faculties. Entity sets need not be disjoint.

Entity Relationship (ER) Diagram

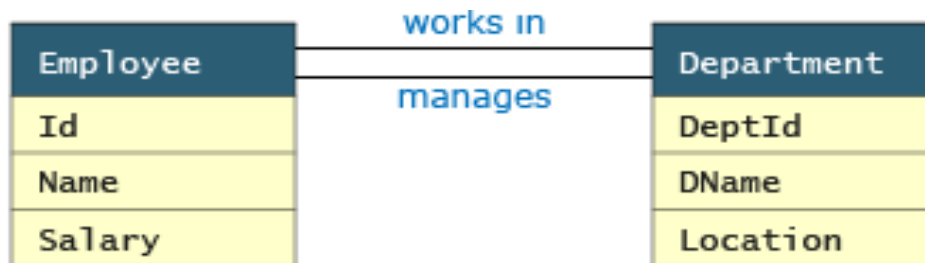
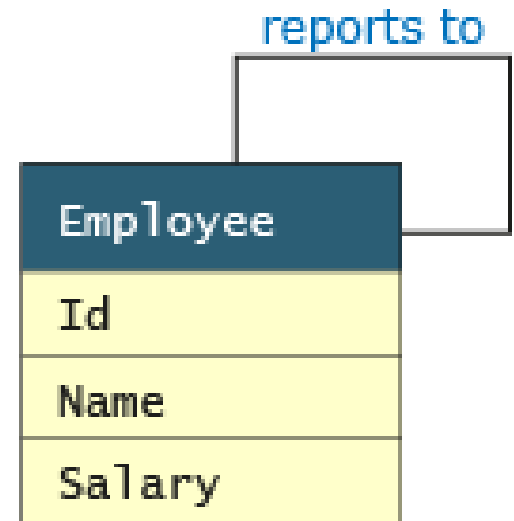
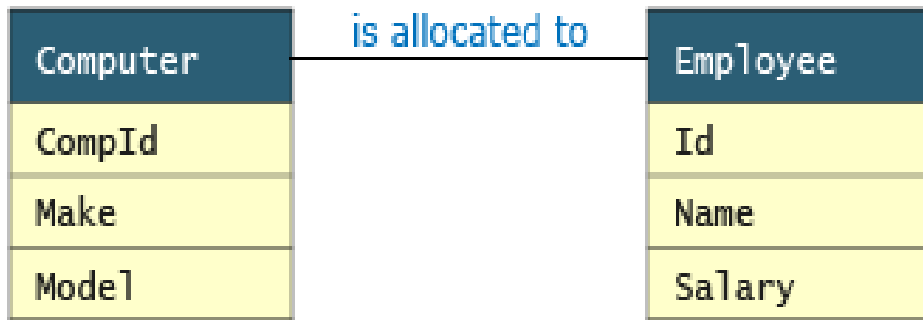
- It is a graphical representation of entities and their relationships which helps in understanding data independent of the actual database implementation.

Term	Definition	Examples
Entity	Real world objects which have an independent existence and about which we intend to collect data.	Employee, Computer
Attribute	A property that describes an entity.	Name, Salary



Relationship

- ❑ Association of one entity with another entity.
- ❑ Each relationship has a name
- ❑ e.g. a Computer is allocated to an Employee.



Strong Entity Set vs Weak Entity Set

Strong entity set	Weak entity set
A single rectangle is used for the representation of a strong entity set.	A double rectangle is used for the representation of a weak entity set.
It contains sufficient attributes to form its primary key.	It does not contain sufficient attributes to form its primary key.
A diamond symbol is used for the representation of the relationship that exists between the two strong entity sets.	A double diamond symbol is used for the representation of the identifying relationship that exists between the strong and weak entity set.
A single line is used for the representation of the connection between the strong entity set and the relationship.	A double line is used for the representation of the connection between the weak entity set and the relationship set.
Total participation may or may not exist in the relationship.	Total participation always exists in the identifying relationship.

Questions

Question 1:

- ER diagram of Company has the following description :
- Company has several departments.
- Each department may have several Location.
- Departments are identified by a name, D_no, Location.
- A Manager control a particular department.
- Each department is associated with number of projects.
- Employees are identified by name, id, address, dob, date_of_joining.
- An employee works in only one department but can work on several project.
- We also keep track of number of hours worked by an employee on a single project.
- Each employee has dependent
- Dependent has D_name, Gender and relationship.

Questions

Question 2:

- ER diagram of Bank has the following description :
- Bank have Customer.
- Banks are identified by a name, code, address of main office.
- Banks have branches.
- Branches are identified by a branch_no., branch_name, address.
- Customers are identified by name, cust-id, phone number, address.
- Customer can have one or more accounts.
- Accounts are identified by acc_no., acc_type, balance.
- Customer can avail loans.
- Loans are identified by loan_id, loan_type and amount.
- Account and loans are related to bank's branch.



Thank You