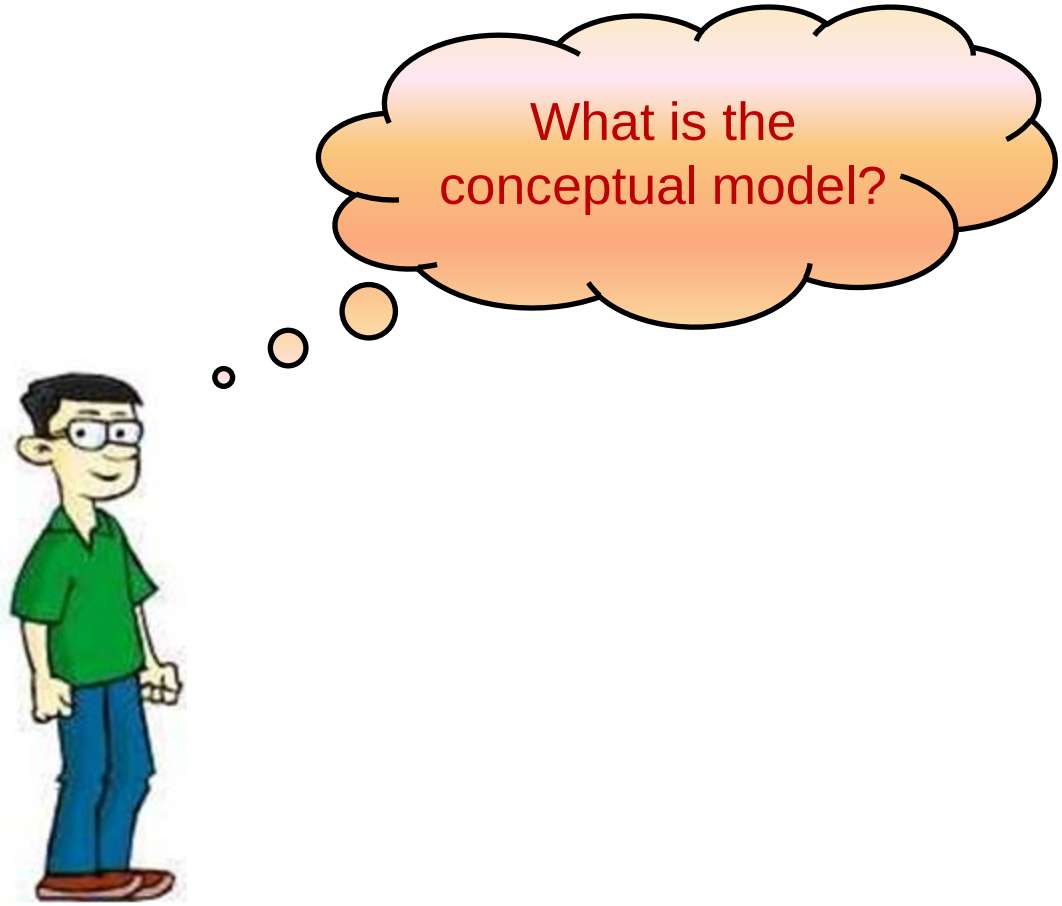
Objectives

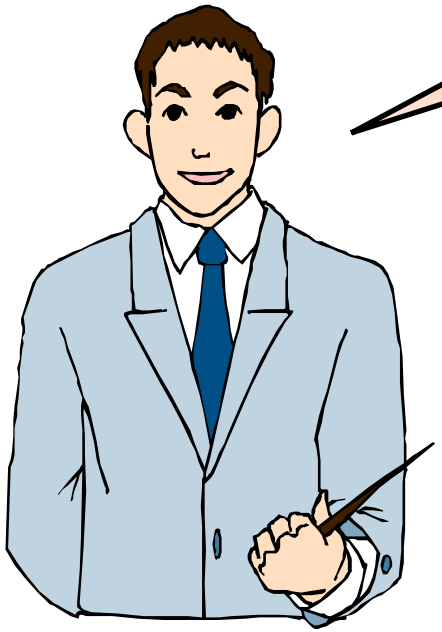
- In this session, you will learn to:
  - Map an ER diagram to a table

Conceptual Model



Conceptual Model (Contd.)

The conceptual model reflects entities and their relationships based on the data-processing needs of an organization.



Conceptual Model (Contd.)

- The conceptual model can be mapped to a relational, hierarchical, or network model.
- Data analysis is the first step in designing a conceptual model.
- Data analysis involves identifying entities, their attributes, and relationships between entities based on the data collected.
- After you complete data analysis, you draw the entity-relationship diagram that gives a detailed overview of the database design.

Mapping ER Diagrams to Tables

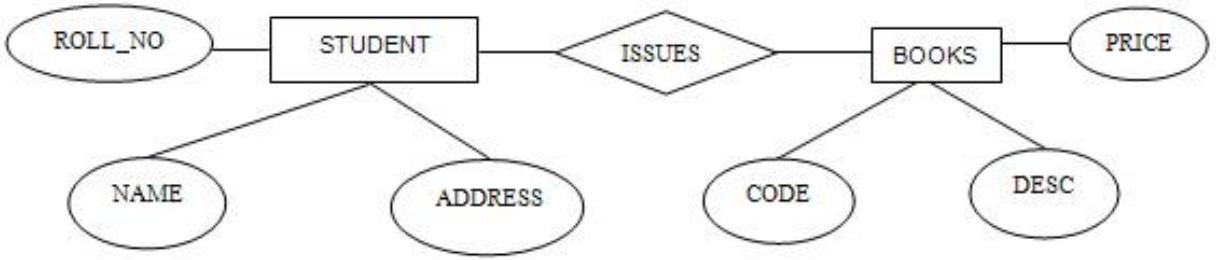
- The following components play an important part while mapping an ER diagram to table:
  - Regular entities
  - Attributes
  - Relationships
  - Weak entities
  - Subtypes and supertypes

Mapping ER Diagrams to Tables (Contd.)

- Regular entities:
  - They can exist alone, independent of any other entity.
  - They are the “building blocks” of the database.
  - Each regular entity maps to a table.
  - For example, STUDENT and BOOKS are two separate entities in the following ER diagram.

Mapping ER Diagrams to Tables (Contd.)

- Attributes:
  - Each property or attribute shown in the ER diagram maps to an attribute in the appropriate table.
  - In the following ER diagram, STUDENT and BOOKS individually has different attributes.



Entity becomes the table and the attributes of the entity become columns of the table.

STUDENT

ROLL_NO	NAME	ADDRESS

BOOKS

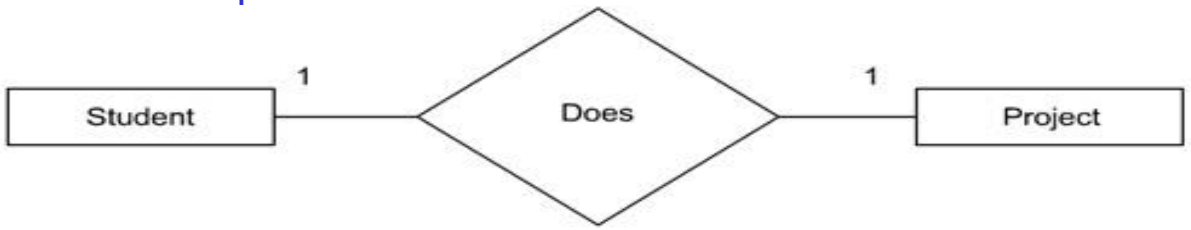
CODE	DESC	PRICE

Mapping ER Diagrams to Tables (Contd.)

- Relationships:
  - There are the following types of relationships:
    - One-to-One
    - One-to-Many
    - Many-to-Many

Mapping ER Diagrams to Tables (Contd.)

- One-to-one relationship:
  - One instance of an entity can relate to only one instance of the related entity.
  - For example:



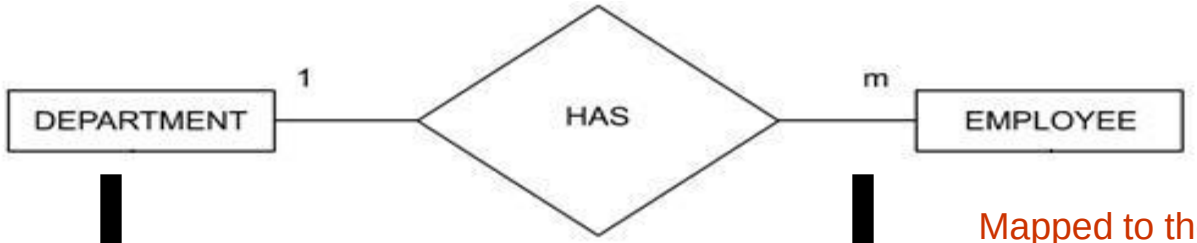
If frequent queries require data from the two tables, then it is better to merge the two tables to improve query performance.

STUDENT

ROLL_NO	NAME	ADDRESS	PROJECT	PROJECT DURATION
R0011	Paul	Shanghai	Banking	16
R0012	Martha	Beijing	Sales Order	20
R0013	Chris	Nanjing	Invoicing	16

Mapping ER Diagrams to Tables (Contd.)

- One-to-many relationship:
  - One instance of an entity can relate to more than one instance of the related entity.
  - For example:



Mapped to the DEPARTMENT table

Mapped to the EMPLOYEE table

DEPARTMENT

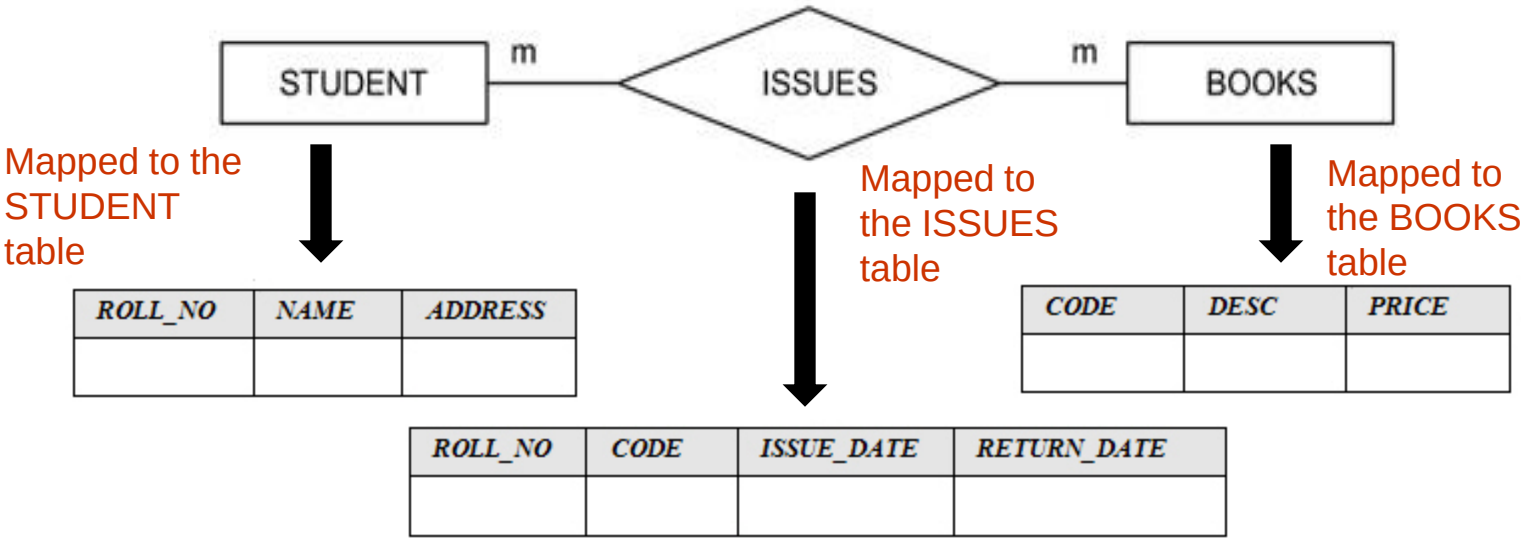
DEPT_ID	DEPT NAME	DEPT HEAD
D001	Marketing	John S.
D002	Accounts	Tony D.

EMPLOYEE

EMP_ID	NAME	ADDRESS	DEPT_ID
E001	Robert P.	Shanghai	D001
E002	Polly W.	Beijing	D001
E003	David J.	Nanjing	D002
E004	Nelson G.	Shanghai	D002

Mapping ER Diagrams to Tables (Contd.)

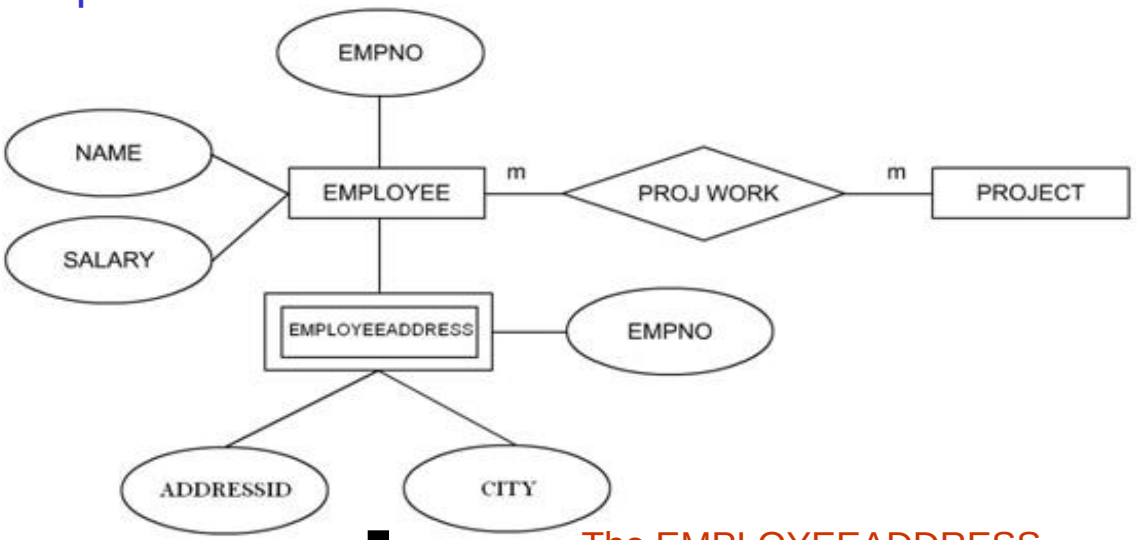
- Many-to-many relationship:
  - Many instances of an entity can relate to more than one instance of the related entity.
  - For example:



The primary keys, ROLL_NO and CODE of the STUDENT and BOOKS table will act as the foreign keys in the ISSUE table.

Mapping ER Diagrams to Tables (Contd.)

- Weak entity:
  - It is an entity whose existence depends on some other entity.
  - For example:



The EMPLOYEEADDRESS entity can be mapped to a separate table.

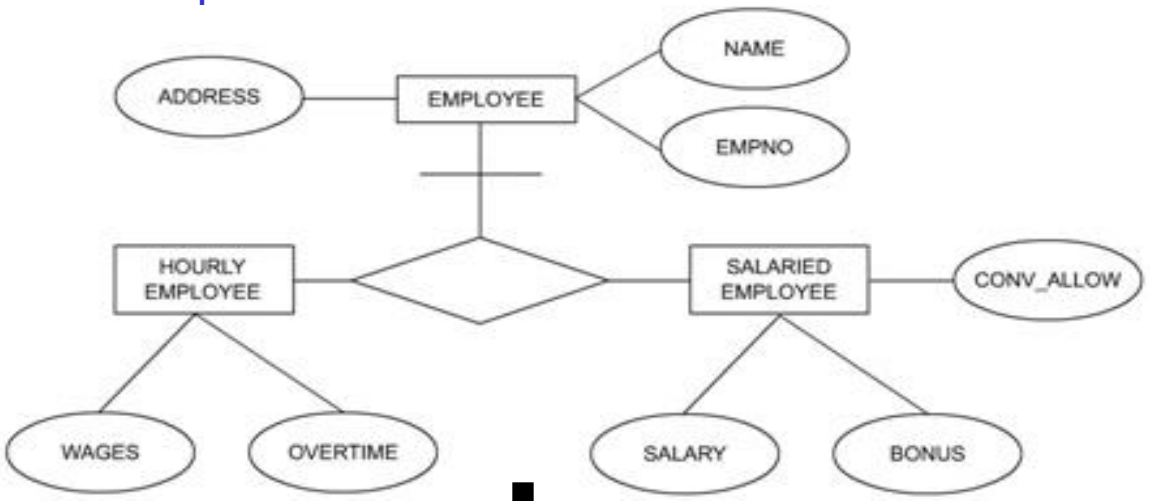
DEPNO	EMPNO	DNAME

Mapping ER Diagrams to Tables (Contd.)

- Subtypes and supertypes:
  - A subtype is a subset of another entity.
  - A subtype is always dependent on supertype for its existence.
  - The primary key of the supertype creates a link between the supertype and subtypes.

Mapping ER Diagrams to Tables (Contd.)

- For example:



Supertype →

EMPLOYEE

EMPNO	NAME	ADDRESS

Each subtype and supertype maps to a separate table.

Subtypes →

HOURLY EMPLOYEE

EMPNO	WAGES	OVERTIME

SALARIED EMPLOYEE

EMPNO	SALARY	BONUS	CONV_ALLOW

Foreign Key

Summary

- In this session, you learned that:
  - The conceptual model reflects entities and their relationships. Data analysis helps determine entities and relationships. The conceptual model is independent of the system where it is to be implemented.
  - Regular entities are not dependent. They can exist in isolation, independent of any other entity.
  - Each entity maps to a table. Each attribute in an ER diagram maps to a column in a table.
  - Entities with common attributes should be merged. Attributes may acquire further attributes and become entities.
  - The mapping of relationships depends on the type of relationship. Each type of relationship maps to tables in a different manner in the relational database management system.

Summary (Contd.)

- In one-to-one relationship, one instance of an entity can relate to only one instance of the related entity.
- In one-to-many relationship, one instance of an entity can relate to more than one instance of the related entity.
- Many-to-many relationships map to tables. One-to-one relationships are not very common and may map to foreign keys in tables.
- A weak entity is an entity whose existence depends on some other entity.
- A subtype is a subset of another entity. A subtype is always dependent on supertype for its existence.
- The primary key of the supertype is the foreign key of the subtype. It creates a link between the two.