15CSE302 Database Management Systems

Lecture 8 Entity Relationship Diagram session 2

B.Tech /III Year CSE/V Semester **L T P C 2 0 2 3**

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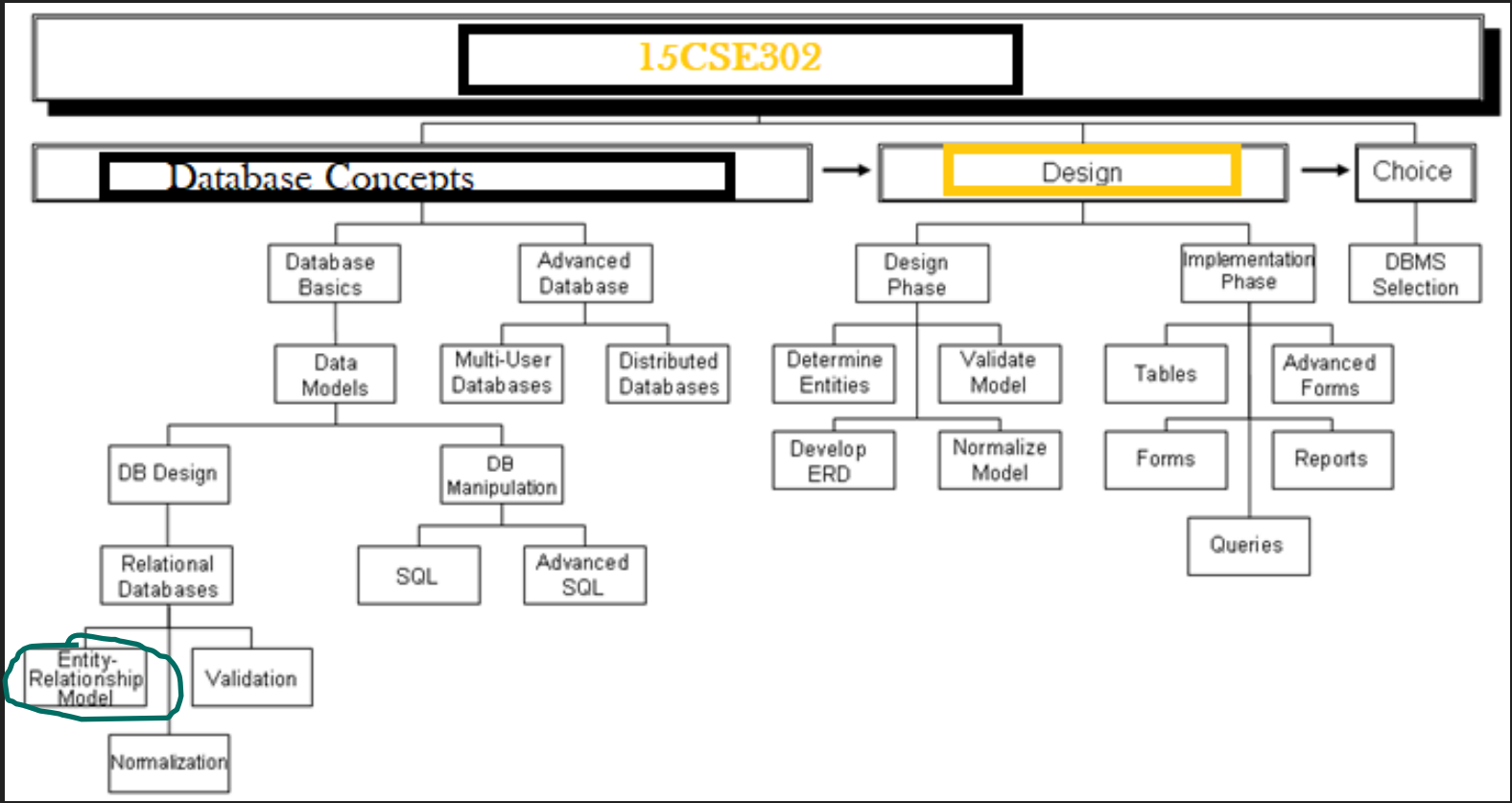
Slides Courtesy :CMSC424, Spring 2005

Syllabus


15CSE302
Database Concepts
Design
Choice
Database Basics
Advanced Database
Design Phase
Implementation Phase
DBMS Selection
Data Models
Multi-User Databases
Distributed Databases
Determine Entities
Validate Model
Tables
Advanced Forms
DB Design
DB Manipulation
Develop ERD
Normalize Model
Forms
Reports
Relational Databases
SQL
Advanced SQL
Queries
Entity-Relationship Model
Validation
Normalization

Brief Recap of Previous Lecture

- **ER diagram**

Today's Lecture

- ER Diagram examples
- Types of Attributes

Country Bus Company

A Country Bus Company owns a number of busses.

- Each bus is allocated to a particular route, although some routes may have several busses.
- Each route passes through a number of towns.
- One or more drivers are allocated to each stage of a route, which corresponds to a journey through some or all of the towns on a route.
- Some of the towns have a garage where busses are kept and each of the busses are identified by the registration number and can carry different numbers of passengers, since the vehicles vary in size and can be single or double-decked.
- Each route is identified by a route number and information is available on the average number of passengers carried per day for each route.
- Drivers have an employee number, name, address, and sometimes a telephone number.

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Entities

- Bus - Company owns busses and will hold information about them.
- Route - Buses travel on routes and will need described.
- Town - Buses pass through towns and need to know about them
- Driver - Company employs drivers, personnel will hold their data.
- Stage - Routes are made up of stages
- Garage - Garage houses buses, and need to know where they are.

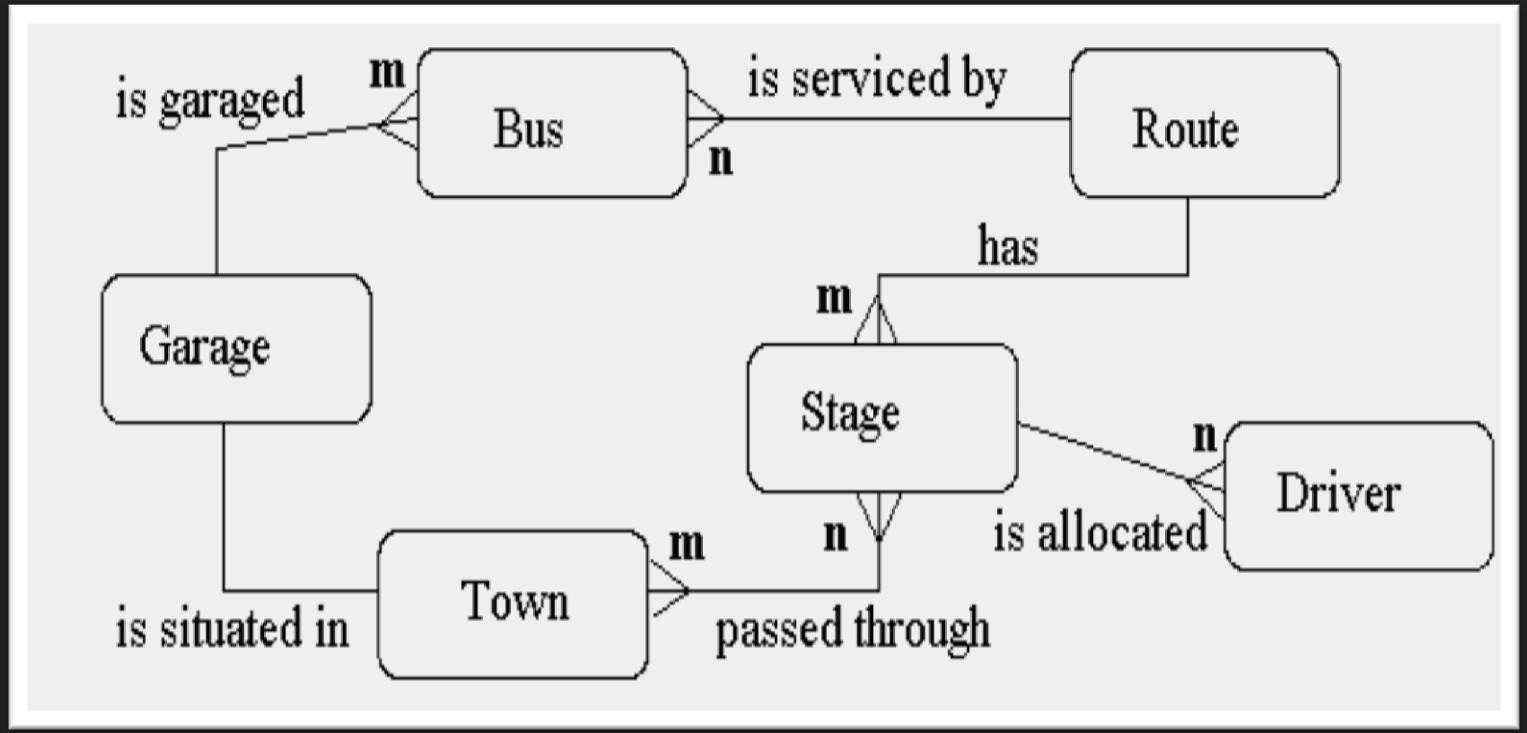
Attributes

Bus (reg-no,make,size,deck,no-pass)
Route (route-no,avg-pass)
Driver (emp-no,name,address,tel-no)
Town (name)
Stage (stage-no)
Garage (name,address)

Relationships

- A bus is allocated to a route and a route may have several buses.
- Bus-route (m:1) is serviced by bus
- A route comprises of one or more stages. route-stage (1:m) comprises
- One or more drivers are allocated to each stage. driver-stage (m:1) is allocated
- A stage passes through some or all of the towns on a route. stage-town (m:n) passes-through
- A route passes through some or all of the towns route-town (m:n) passes-through
- Some of the towns have a garage garage-town (1:1) is situated
- A garage keeps buses and each bus has one `home' garage garage-bus (m:1) is garaged

E-R diagram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m
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n
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Garage
Stage
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Driver
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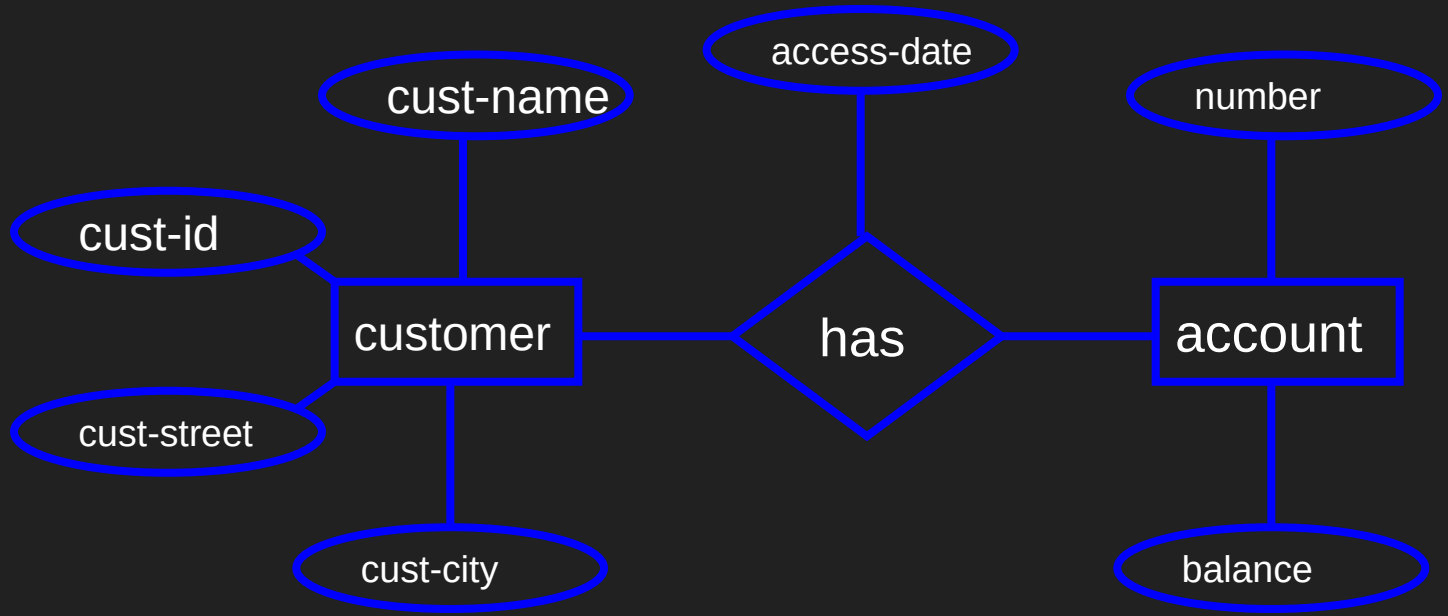
passed through

Steps to draw an ER diagram

- Identify entities
- Remove duplicate entities
- List the attributes of each entity
- Mark the primary keys.
- Define the relationships
- Describe the cardinality of the relationships
- Remove redundant relationships
- Examine the ER model for redundant relationships.

ER Diagram: Example



Rectangles: entity sets Diamonds: relationship sets Ellipses: attributes

Next: Relationship Cardinalities

- We may know:

  One customer can only open one account

  OR

  One customer can open multiple accounts

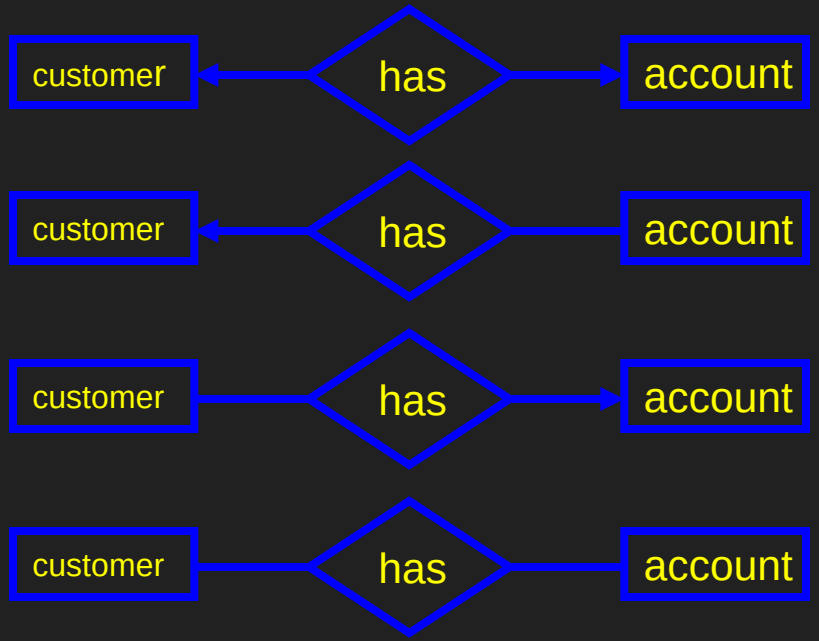
- Representing this is important Why ?
  - Better manipulation of data
  - Can enforce such a constraint
  - Remember: If not represented in conceptual model, the domain knowledge may be lost

Mapping Cardinalities

- Express the number of entities to which another entity can be associated via a relationship set
- Most useful in describing binary relationship sets

Mapping Cardinalities

- One-to-One e.g. A customer has an account
- One-to-Many e.g. A customer has many accounts
- Many-to-One e.g. Customers have an account
- Many-to-Many e.g. Customers have many accounts



Mapping Cardinalities

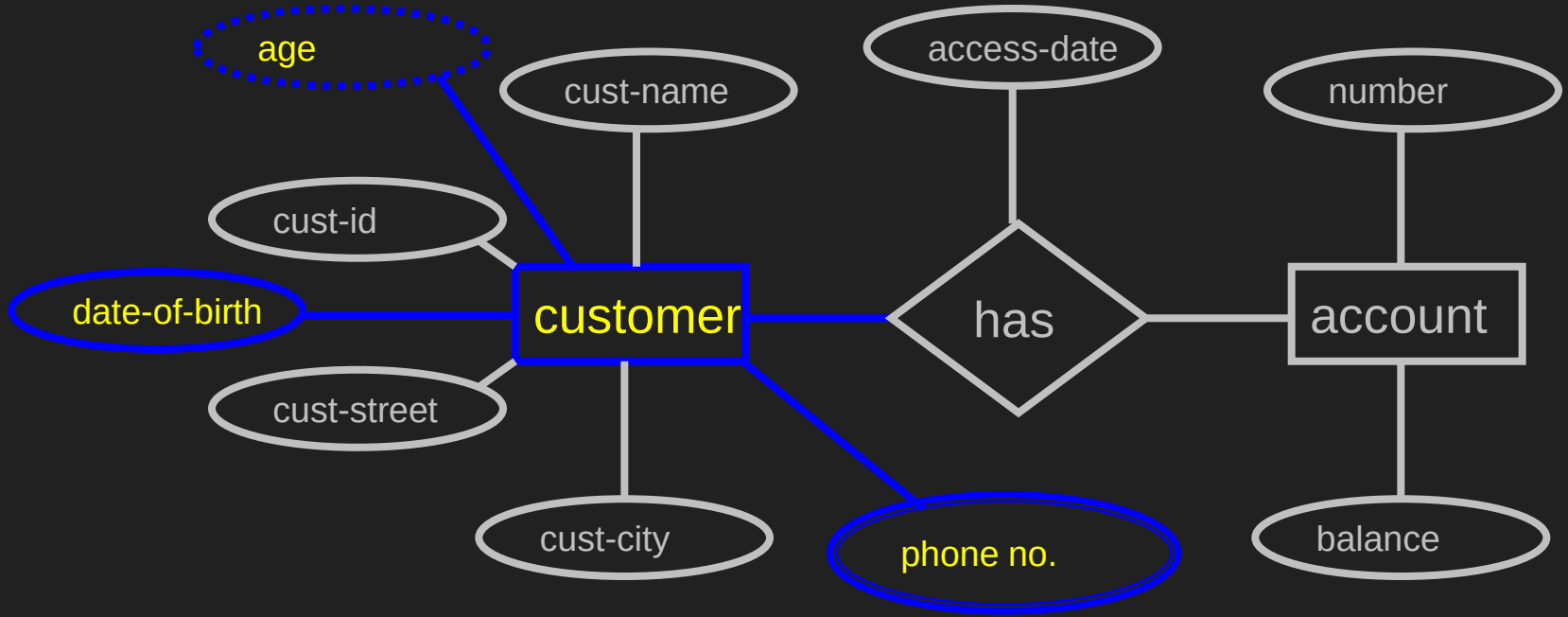
- Express the number of entities to which another entity can be associated via a relationship set
- Most useful in describing binary relationship sets
- N-ary relationships ?

Types of Attributes

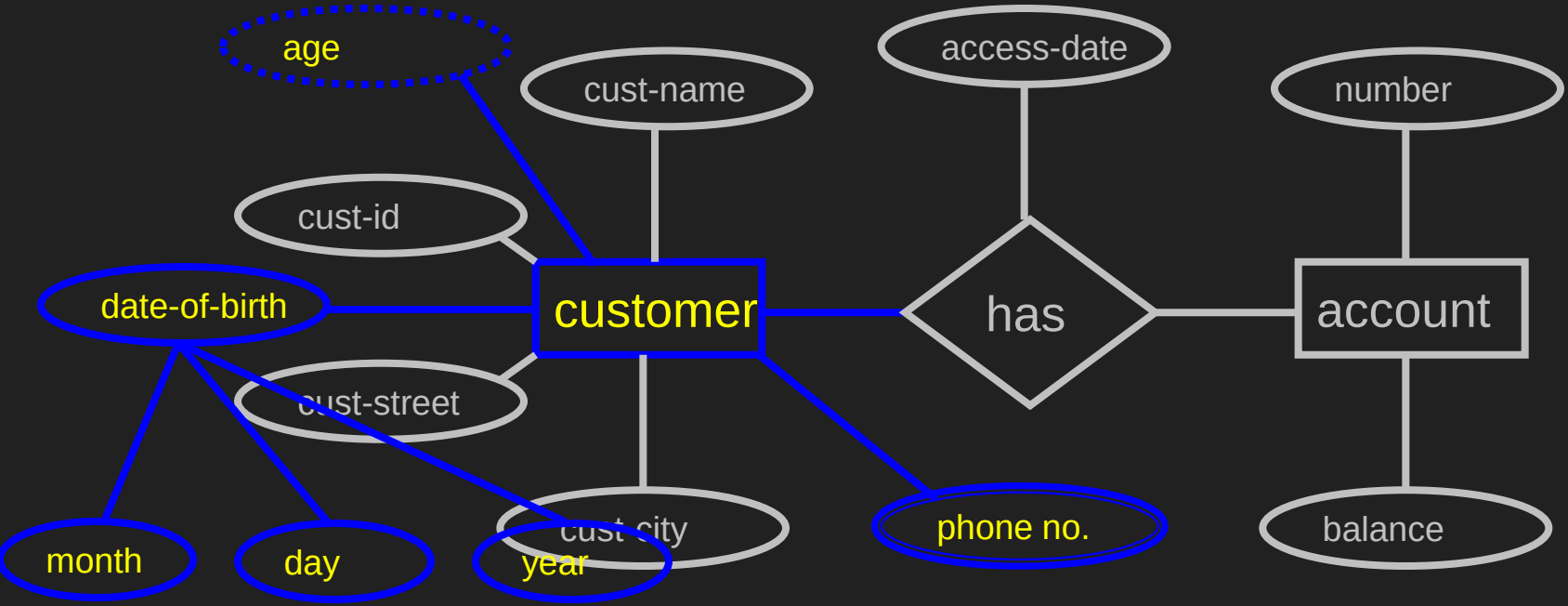
- Simple vs Composite
  - Single value per attribute ?
- Single-valued vs Multi-valued
  - E.g. Phone numbers are multi-valued
- Derived
  - If date-of-birth is present, age can be derived
    - Can help in avoiding redundancy, enforcing constraints etc…

Types of Attributes

- multi-valued (double ellipse)
- derived (dashed ellipse)

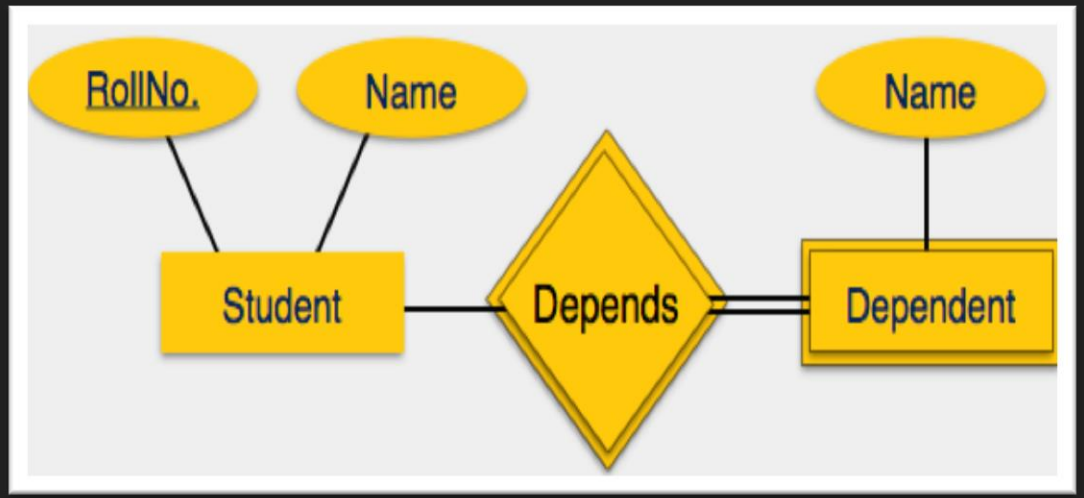


Types of Attributes



Composite Attribute

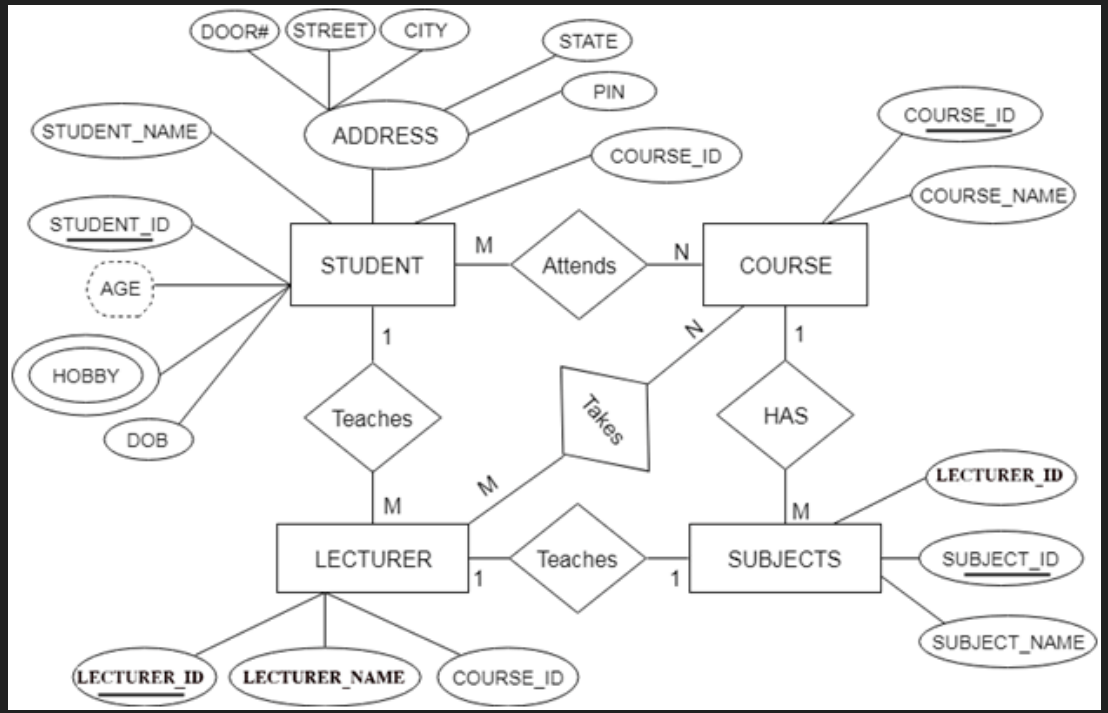
Weak Entity -> represented by double rectangle



Student is a strong entity
Dependent is a weak entity represented with double rectangle

Schema DIAGRAM OF University database

Example :University Management System



Assignment :Draw an ER diagram for Hospital Management System

- Identify entities
- Remove duplicate entities
- List the attributes of each entity
- Mark the primary keys.
- Define the relationships
- Describe the cardinality of the relationships
- Remove redundant relationships
- Examine the ER model for redundant relationships.

Summary

- E R Model examples
  - Entity
  - Attributes -Types of attributes and representation
  - Relationship

Next Lecture

- **E R Model** –Key attributes
- **examples**

References

https://www.db-book.com/db6/index.html

Thank You

Happy to answer any questions ! ! !