Chapter 2B:

ENTITY RELATIONSHIP DIAGRAM

(ERD)

In This Lecture

- Entity/Relationship models
  - Entities and Attributes
  - Relationships

Entity Name

Entity

Person,place,object,event or concept about which data is to be maintained

Example: Car, Student

Jack

Attribute Name

Attribute

Property or characteristic of an entity

Example: Color of car Entity Name of Student Entity

Relation

Verb Phrase

Association between the instances of one or more entity types

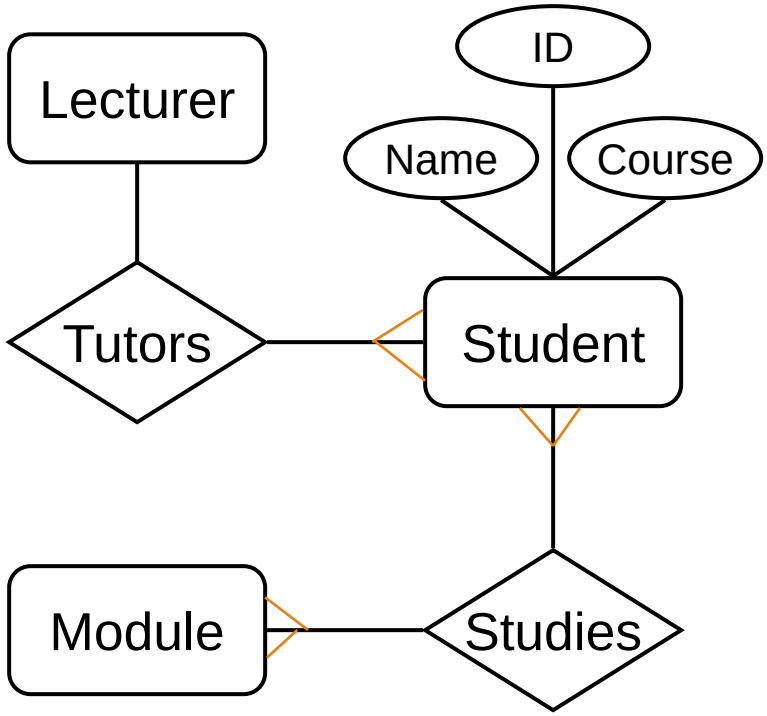
Example: Blue Car Belongs to Student Jack

Entity/Relationship Diagrams

Give a **conceptual view** of the database

In a University database we might have entities for Students, Modules and Lecturers.

Students might have attributes such as their ID, Name, and Course, and could have relationships with Module and Lecturers.



Entities

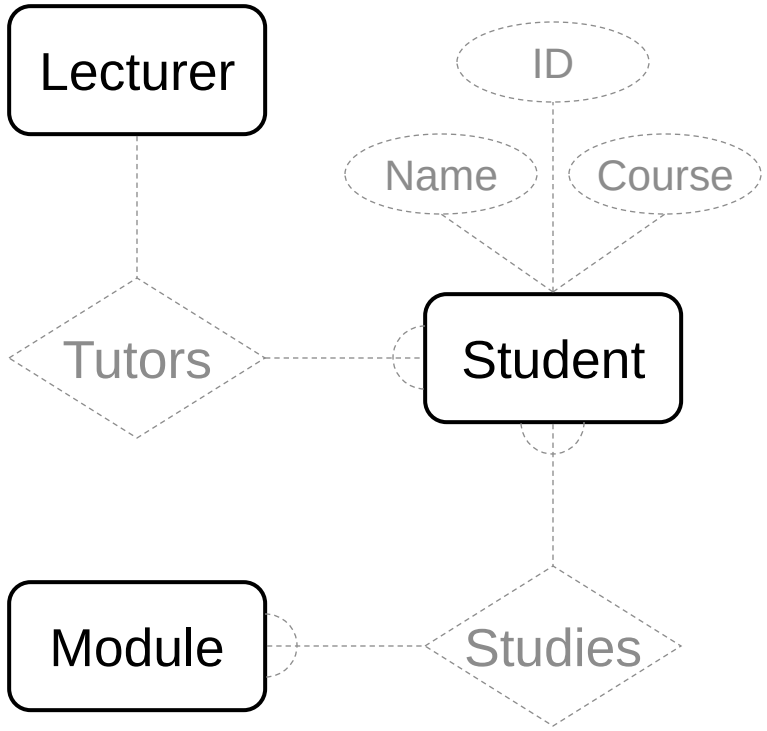
- **Entities represent objects or things of interest**
  - Physical things like students, lecturers, employees, products.
  - More abstract things like modules, orders, courses, projects.

Entities have

- A general type or class, such as Lecturer or Module
- Attributes (such as name, email address)

Diagramming Entities

- In an E/R Diagram, an entity is usually drawn as a **box** with rounded corners.
- The box is labelled with the name of the class of objects represented by that entity.



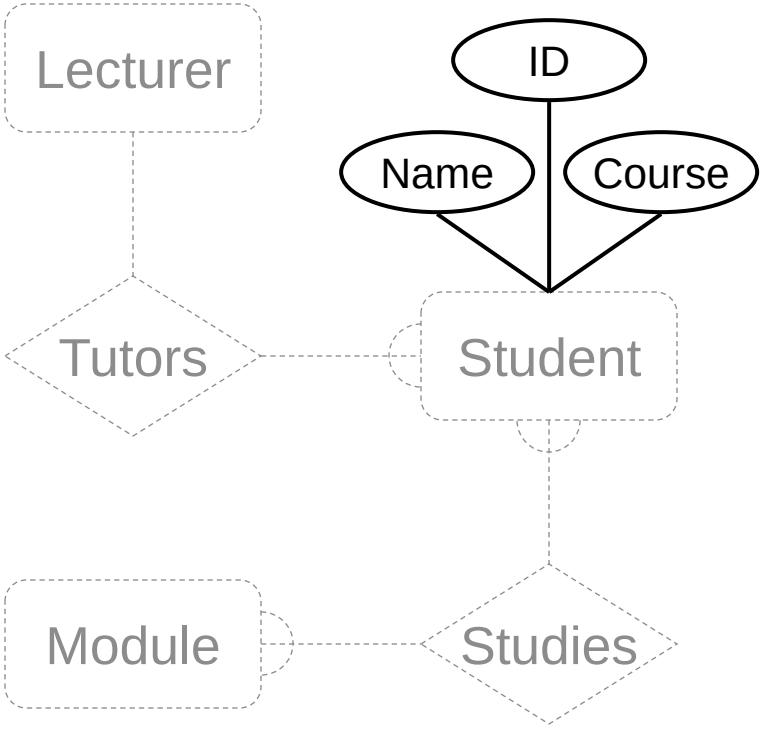
Attributes

- **Attributes are facts, aspects, properties, or details about an entity**
  - Students have IDs, names, courses, addresses, …
  - Modules have codes, titles, credit weights, levels, …

- Attributes have
  - A name
  - An associated entity

Diagramming Attributes

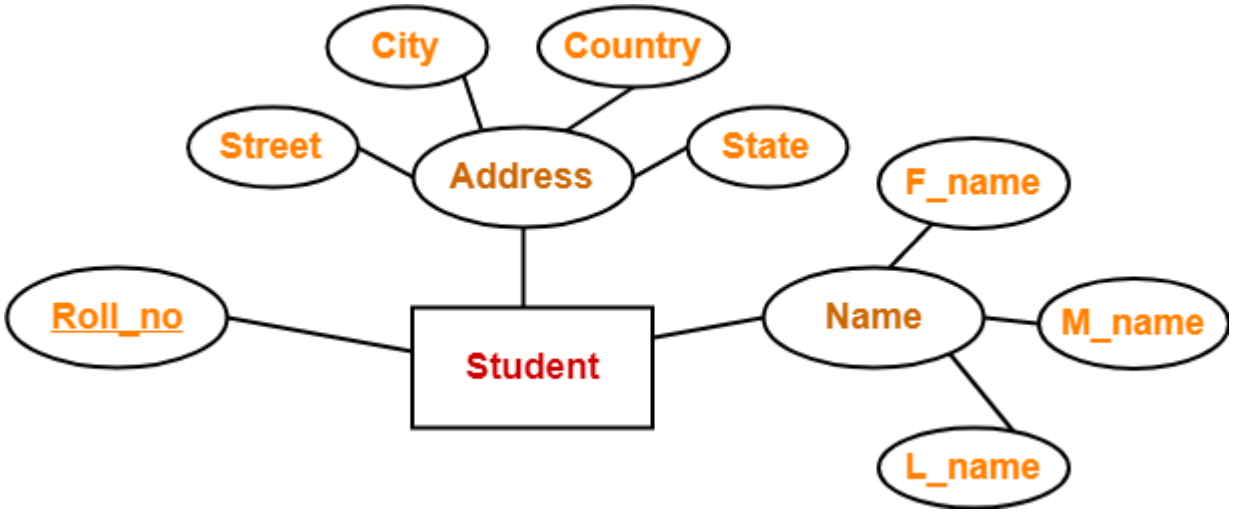
- In an E/R Diagram attributes drawn as ovals
- **Each attribute is linked to its entity by a line.**
- The name of the attribute is written in the oval.



Types of attributes

Composite attributes

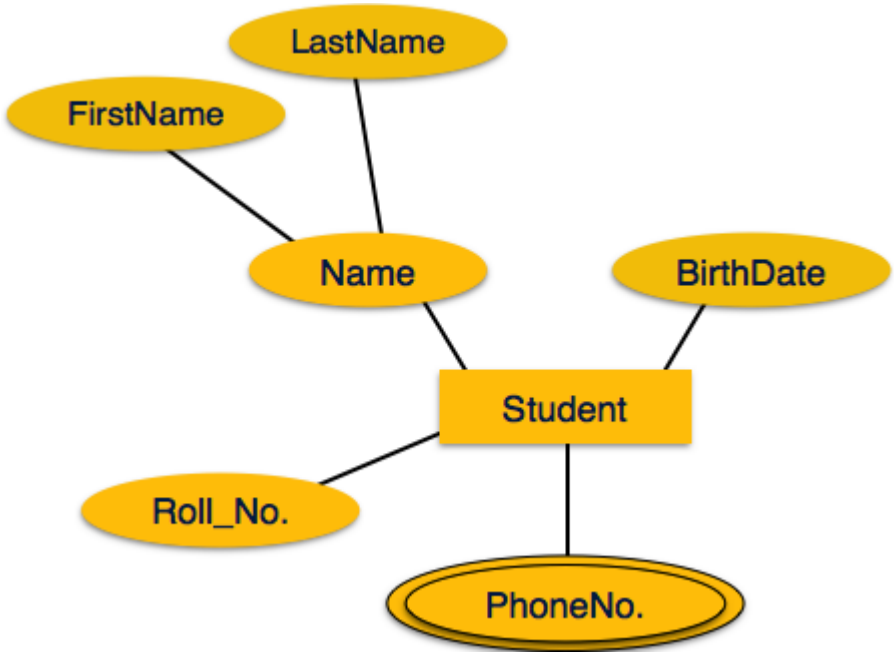
Main attributes further divided into sub-attributes



Multivalued attributes

Drawn in double ellipse.

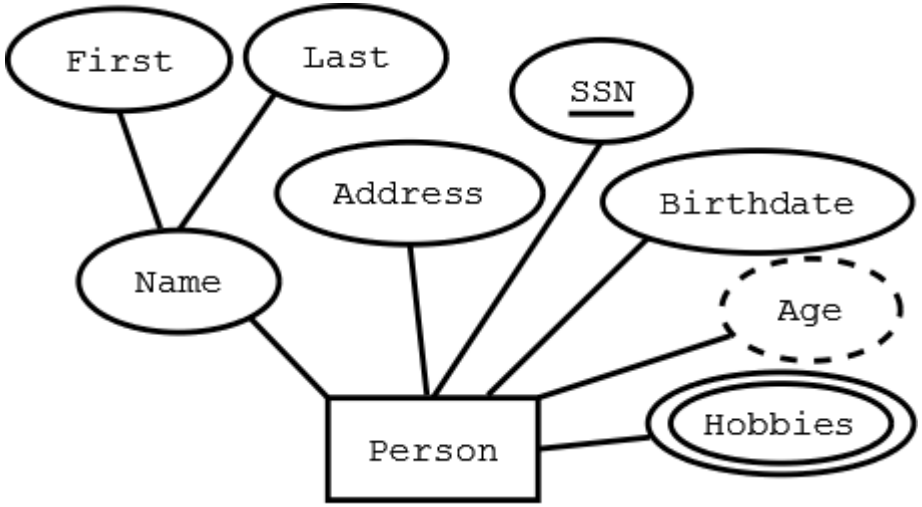
Have more than one value.



Derived attributes

Drawn in dashed ellipse..

You can calculate something from the single attribute.



Relationships

- **Relationships are an association between two or more entities**
  - Each Student takes several Modules.
  - Each Module is taught by a Lecturer.
  - Each Employee works for a single Department.

- Relationships have:
  - A name
  - A set of entities that participate in them

Relationship

One to one (1:1)

- **Each** lecturer has **a unique** office

One to many (1:M)

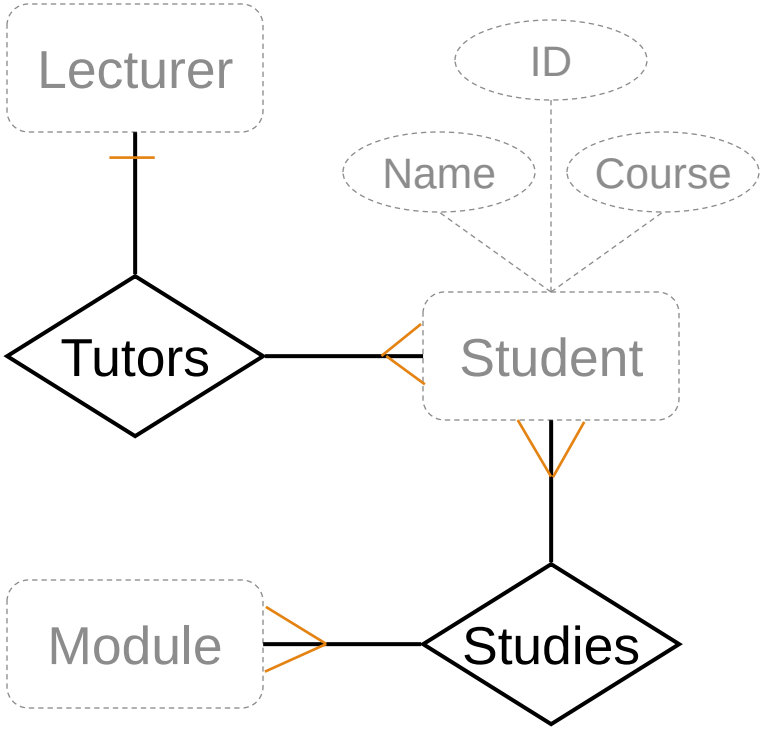
- **A lecturer** may tutor **many students**.

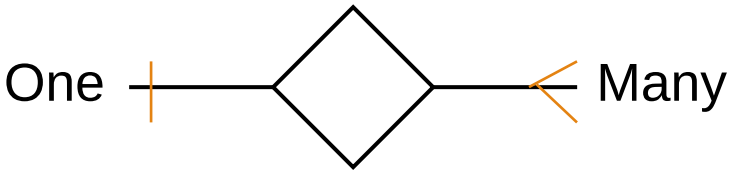
Many to many (M:M)

- **Students** takes **several modules**.

Diagramming Relationships

- Relationships are links between two entities
- The name is given in a **diamond** box.





Example - **Entities**

A university consists of a number of **departments**. Each department offers several **courses**. A number of **modules** make up each course. **Students** enrol in a particular course and take modules towards the completion of that course. Each module is taught by a **lecturer** from the appropriate department, and each lecturer tutors a group of students

Example - Relationships

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Chen ERD Symbols

Peter Chen was the one responsible for coming up with the Chen ERD notation. He was one of the first individuals who used ERD in database design.