



BITS, PILANI – K. K. BIRLA GOA CAMPUS

Database Systems

(CS F212)

by

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Chapter 2: Entity-Relationship Model

- Entity Sets
- Relationship Sets
- Design Issues
- Mapping Constraints
- Participation Constraints
- Keys
- E-R Diagram
- Design of an E-R Database Schema

Revision

- Data abstraction
 - Physical level
 - Logical level
 - View level
- Data Independence
 - Physical data independence
 - Logical data independence
- Instances and Schema
- Database users
 - Naïve user
 - Sophisticated user
 - Specialized user
 - Application programmers
 - Database administrator
- Overall system structure

Data model

- A data model is the collection of tools for describing data, data relationship and consistency constraints.
- Data models:
 - ER model- high level data model
 - Relational model- low level data model
 - Hierarchical model
 - Network model
 - Object oriented model
 - Object relational model

ER diagram

- When to draw?
- Why to draw?
- What to draw?
- How to draw?

ER model

- **Entity Relationship** model
- The ER model perceives the real world as consisting of basic objects, called **entities**, and **relationships** among these objects.
- **Entity**: An entity is an object that exists and is distinguishable from other objects.
 - Example: specific person, company, event, plant

ENTITY SET

- **Entity set:** An entity set is a set of entities of the same type that share the same properties.
 - Example: set of all persons, companies, trees, holidays

Person(uid, name, address, phone_no)

Classroom(lecture_hall_no, capacity,
no_of_benches, no_of_boards)

ATTRIBUTES



The diagram consists of three blue arrows originating from the word 'ATTRIBUTES' at the bottom. One arrow points to the attribute list '(uid, name, address, phone_no)' of the 'Person' entity set. Another arrow points to the attribute list '(lecture_hall_no, capacity, no_of_benches, no_of_boards)' of the 'Classroom' entity set. A third arrow points to a red rectangular box located above the 'Person' entity set, which is currently empty.

Mapping Entity set to Relation (table)

- Name of the entity set is name of the table

ATTRIBUTE

- An entity is represented by a set of attributes, that is **descriptive properties** possessed by all members of an entity set.

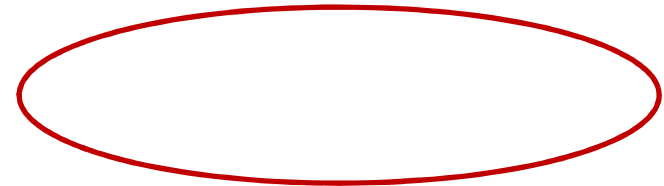
Example:

customer = (customer-id, customer-name,
customer-street, customer-city)

account = (account _no, balance_amt)

loan = (loan-number, amount)

Notation: Ellipse



ATTRIBUTES (Contd...)

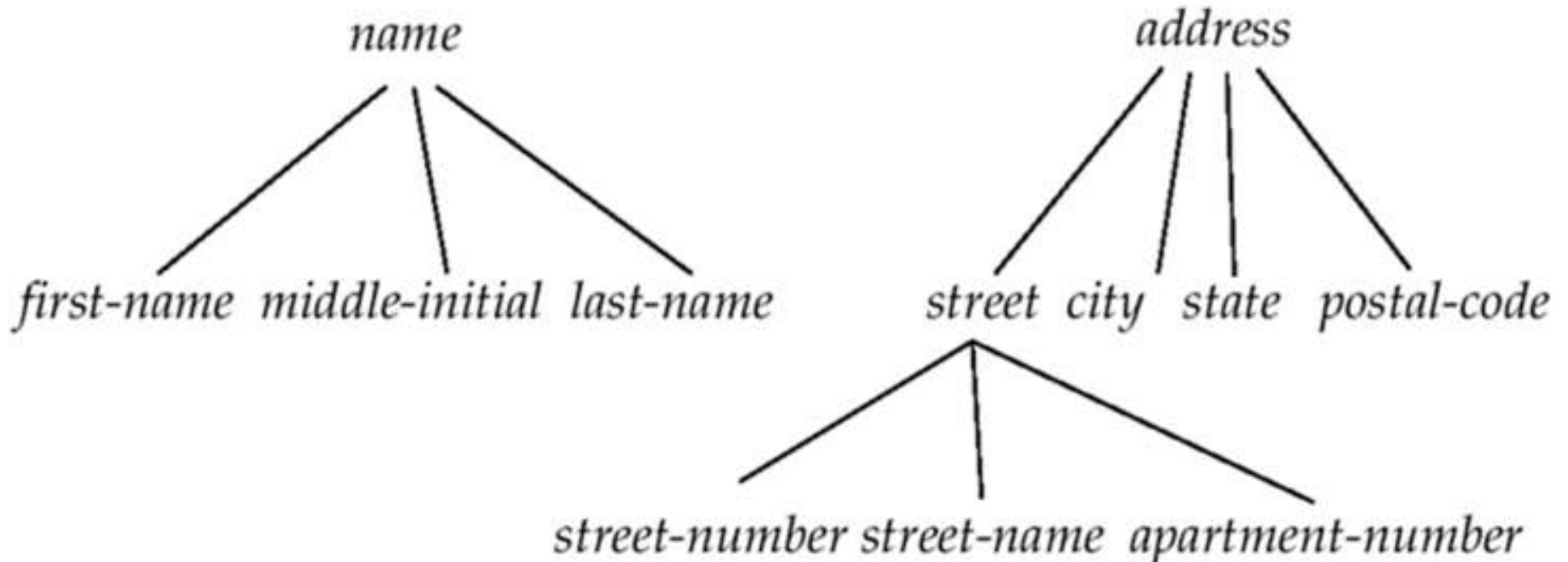
- **Domain/value set** – the set of permitted values for each attribute
- Eg:
 - size of shirt { L, XL, XXL }
 - id {alphanumeric values}
 - gender should be either **'M'** or **'F'**
 - course_no should start with **'AAOC'**, **'BITS'**, **'CS'**,
 - room_no should be between **1** to **300**

Mapping simple attributes to relation

- Each attribute of an entity set maps to each column of the corresponding table

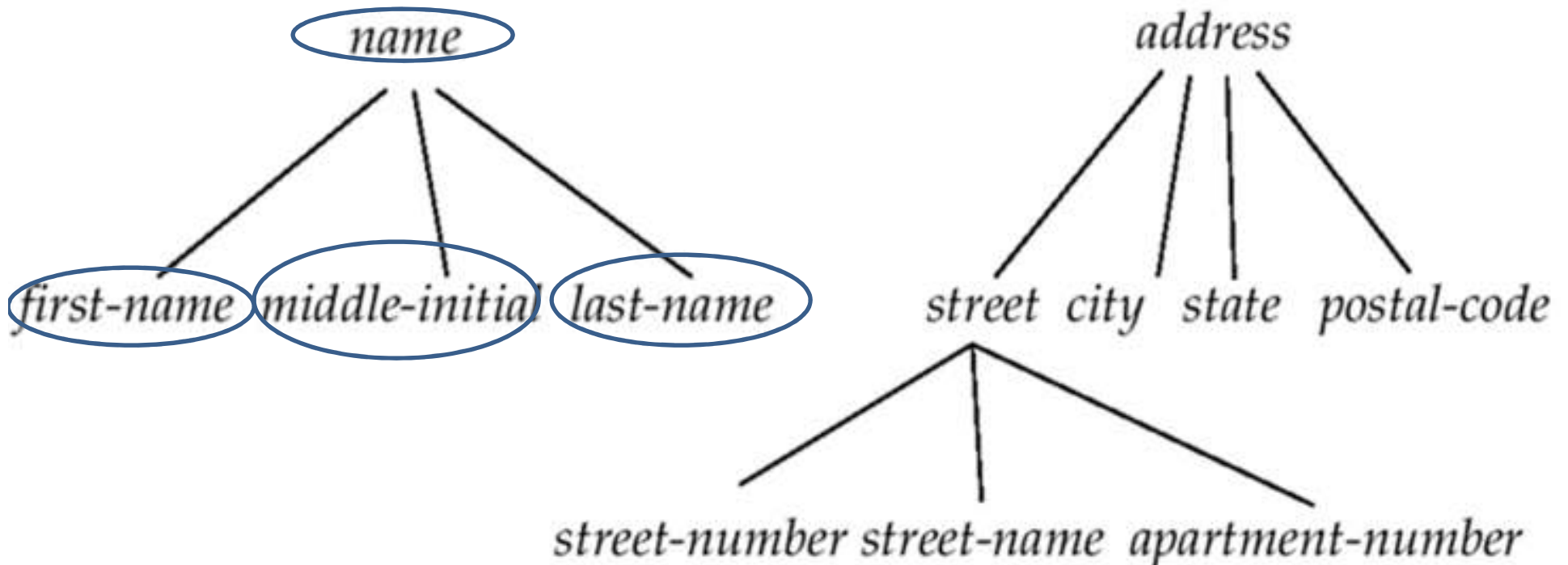
Composite attribute

- Example of attribute



Composite attribute (notation)

- Example of attribute



Composite attribute examples

- Aircraft location
 - Latitude
 - Longitude
 - Altitude

Mapping composite attribute to relation

- Each leaf sub attribute of the entity set is mapped to the column of the corresponding table.
- Egs.

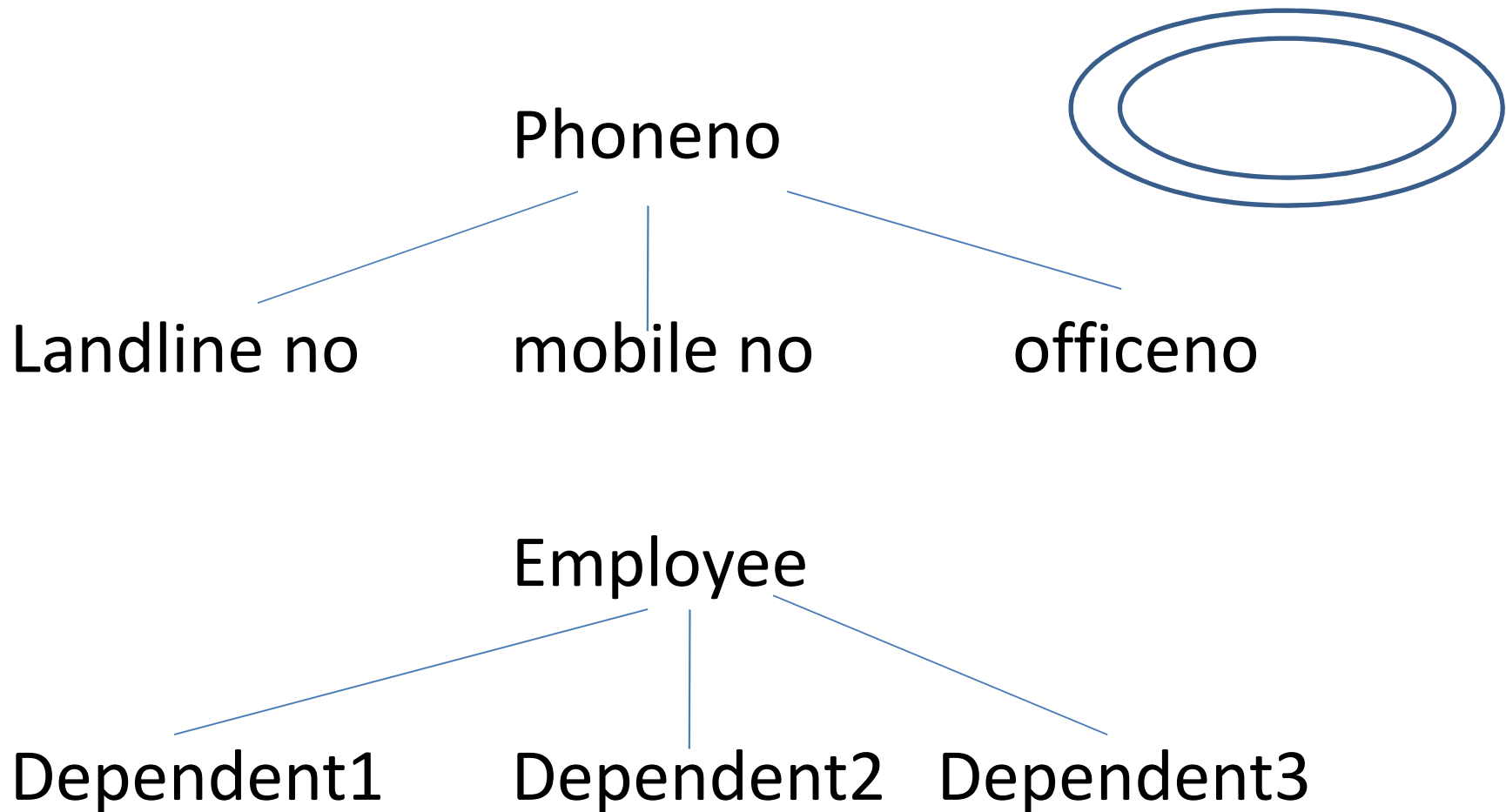
FIRST NAME	MIDDLE NAME	LAST NAME
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Observe there is no column for attribute 'name'

Street num	Street name	Apt num	City	State	Postal-code
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Observe there is no column for attributes 'street' and 'address'

Multivalued attributes



Mapping multivalued attribute to relation

Create a separate table for derived attribute with one column as primary key of corresponding entity set and its attributes as remaining columns.

Emp id	Emp name	Email-id	Expertise
E1	AAA	aaa@email.co	C
E2	BBB	bbb@email.co	SQL
E3	CCC	NULL	Java

Empid	Landline no	Mobile No	Office No
E1	111	222	333
E2	NULL	444	555
E3	NULL	NULL	NULL

Observe: Though phoneno is shown as multivalued attribute in ER diagram, there is no separate column created for 'phone no' in table.