شُروع اَللہ کے پاک نام سے جو بڑا مہر بان نہایت رحم والا ہے

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Database Systems

Lecture 17

Entities Classification and ERD Practices

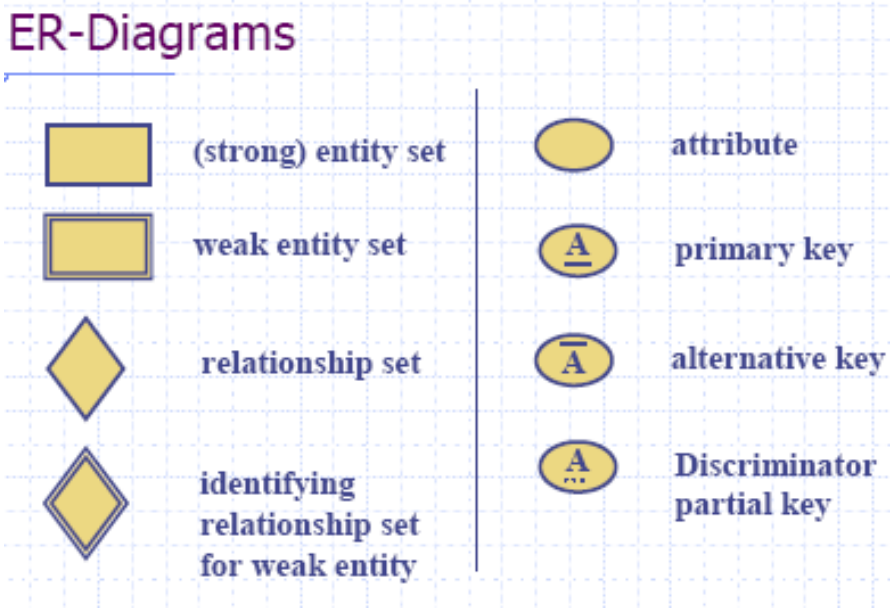
Today's Lecture

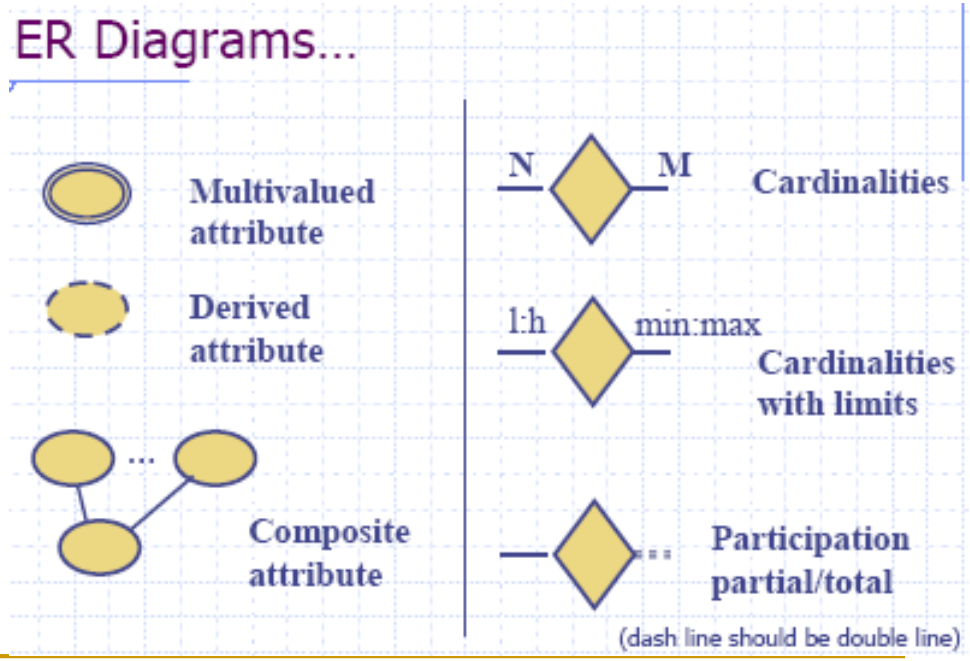
- Entity Relationship Diagram (ERD)
  - Entities Classification
  - ER provides basic for Schema refinement
    - Cardinalities based illustrations
- Practices ERD

Recall Lecture 15

- Database Schema Designing
  - Entity Relationship Diagram (ER-D)
  - Entities and Attributes Identification in an ERD

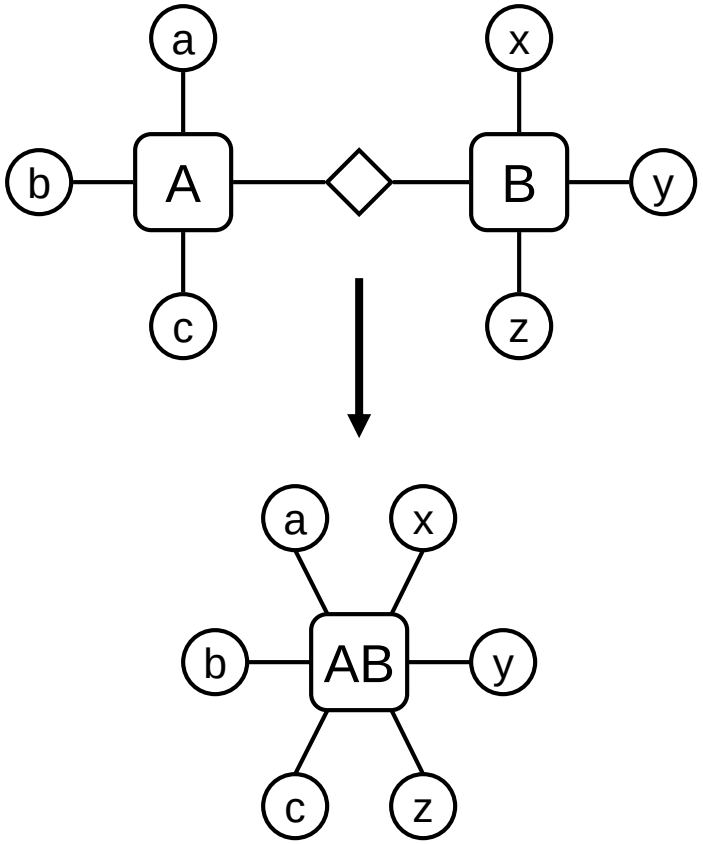
ERD Recall


ER-Diagrams
(strong) entity set
weak entity set
relationship set
identifying relationship set for weak entity
attribute
primary key
alternative key
Discriminator partial key


ER Diagrams...
Multivalued attribute
Derived attribute
Composite attribute
N
M
Cardinalities
1:h
min:max
Cardinalities with limits
Participation partial/total
(dash line should be double line)

Redundant Relationships

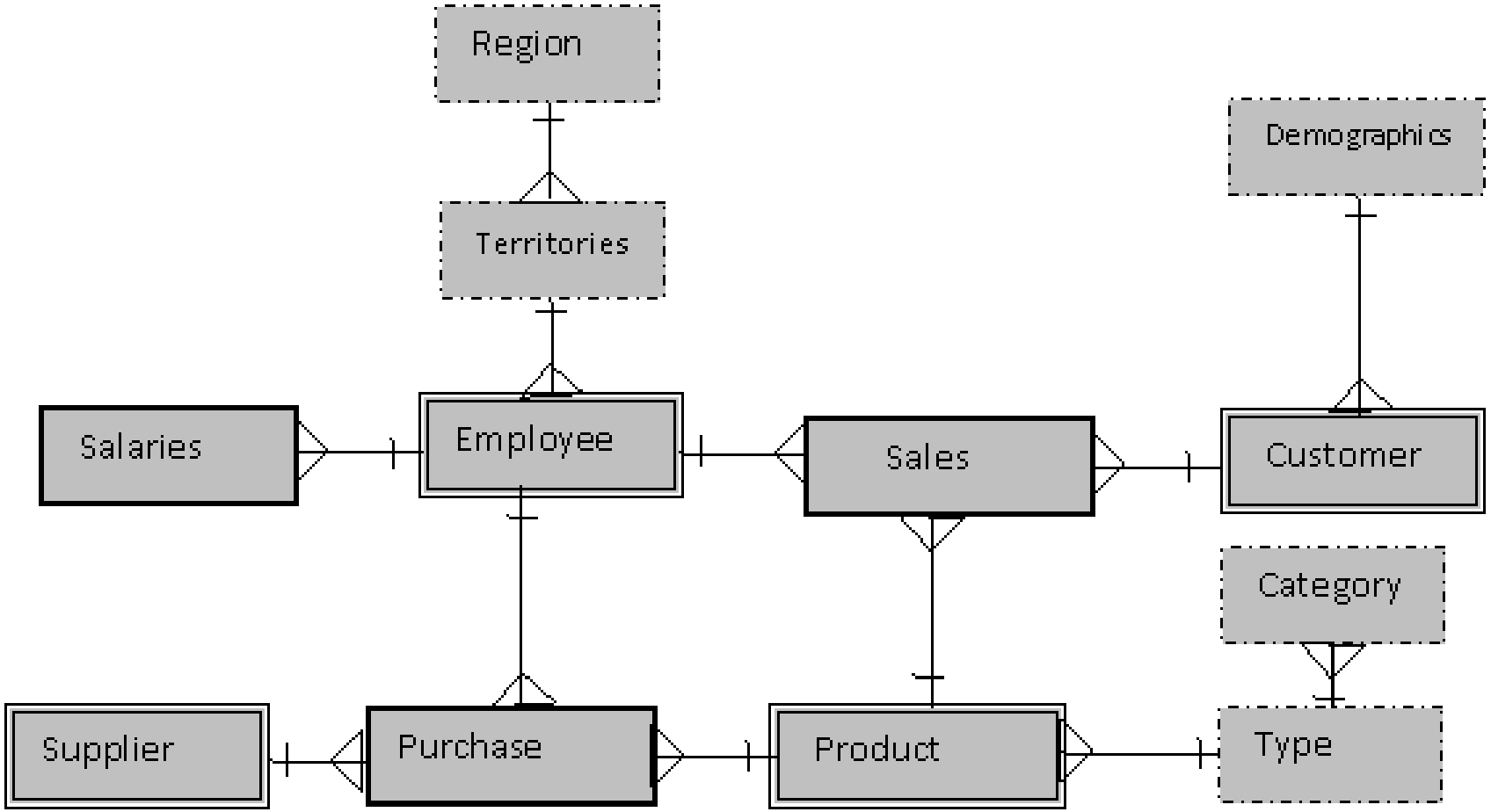
- We can merge the two entities that take part in a redundant relationship together
  - They become a single entity
  - The new entity has all the attributes of the old one



Classification of entities

- Transactional entities
  - Transactional entities defined as entities containing measurements that can be summarized
- Component entities
  - Components entities define how, when, where and why of business Model like
    - Customer who made purchase
    - Product what was sold
    - Location where it was sold
    - Period when it was sold
- Classifying
  - Components having further classification

Classification of entities



Classification of entities

- ***Transaction entities***
  - Entities with dark line box are transactional entities like Purchase, Sales Salaries
- ***Component entities***
  - Entities with double line box are Component entities like Customer, Product, Supplier, and Employee
- ***Classification entities***
  - Entities with dotes line box are Classification entities like Category, Type, Demographics, Territories, Region

Why do we need Transactional entities In ERD

- Why do we need Transactional entities In ERD ?
- If an ERD does not have a transactional entity
- Transactional attributes
- M: M Association between entities

Cardinalities understanding for entities classifications

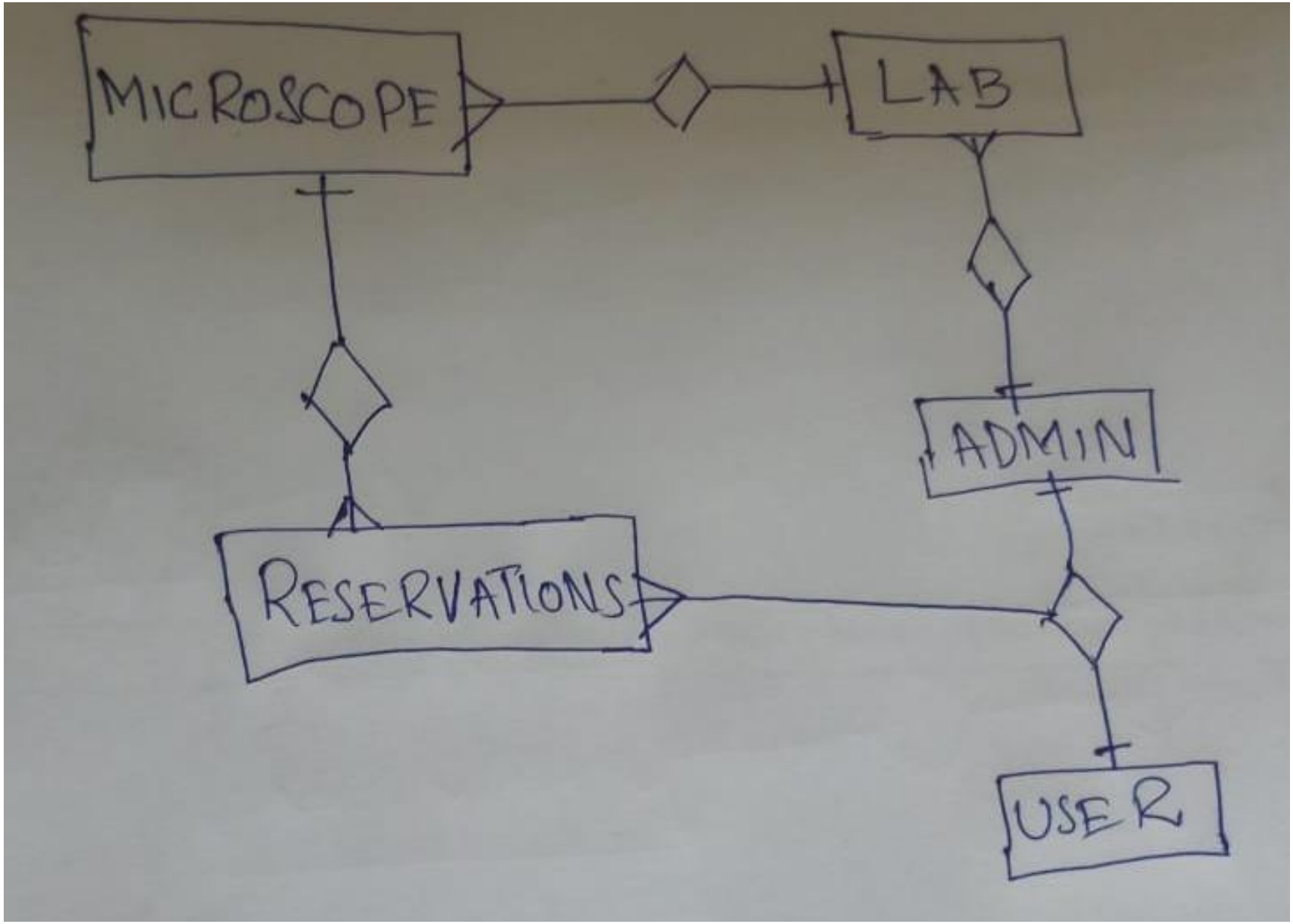
- One to One Relationships
  - 1:1 associations
  - Customer <----- > Address (Recall: one customer have one address)
- One to Many Relationships
  - Customer <----- > Address (One customer have more than one address)
- Many to Many Relationships
  - Customer <----- > Address (One customer have more than one address and one address is also sharing by many customers)

Assignment : Design an ER Diagram

- Design a database for an on-line reservation system for microscopes in material science lab
- There are two types of users: microscope administrators and microscope end users
- Each microscope is located in a specific lab
- Each request is assigned to an administrator who can authorize or deny the request
- Using of some microscope requires the presence of an administrator
- Time is divided into 1 hour slots. Each reservation can only take one or more time slots

Microscope Reservation System (Database Conceptual Schema)

- Identify the transactional entities
  - Reservations
- Identify the hierarchies of component entities
  - Microscope, Admin and user
- Link them with classifying if any
  - Not found


MICROSCOPE
LAB
ADMIN
RESERVATIONS
USER

Practice Case study ERD

Draw an E-R diagram for a real estate firm that lists property for sale. The following describes this organization:

The firm has a number of sales offices in several states. Attributes of sales office include Office_Number (identifier/key) and Location.

Each sales office is assigned one or more employees. Attributes of employee include Employee_ID (identifier/key) and Employee_Name. An employee must be assigned to only one sales office.

For each sales office, there is always one employee assigned to manage that office. An employee may manage only the sales office to which he/she is assigned.

The firm lists property for sale. Attributes of property include Property_ID (identifier) and Location. Components of Location include Address, City, State, and Zip_Code.

Each unit of property must be listed with one (and only one) of the sales offices. A sales office may have any number of properties listed, or may have no properties listed.

Each unit of property has one or more owners. Attributes of owners are Owner_ID (identifier) and Owner_Name. An owner may own one or more units of property. An attribute of the association between property and owner is Percent_Owned.

Summary of Conceptual Design

- *Conceptual design* follows *requirements analysis*,
  - Yields a high-level description of data to be stored
- ER model popular for conceptual design
  - Constructs are expressive, close to the way people think about their applications.
  - Note: There are many variations on ER model
    - Both graphically and conceptually
- Basic constructs: *entities*, *relationships*, and *attributes* (of entities and relationships).
- Some additional constructs: *weak entities*, *ISA hierarchies*, and *aggregation*.

In Next Lecture

- Enhanced Entity Relationship Diagram (EERD)
  - Inheritance in Schema Modeling

Thanks