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

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Database Systems

Lecture 15

Entity Relationship Diagram (ERD) and Entities Classification

Today's Lecture

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

Recall Lecture 14

- Database Schema Designing
  - Entity Relationship Diagram (ER-D)
  - How to Design an ERD

Entities and Attributes

- Sometimes it is hard to tell if something should be an entity or an attribute
  - They both represent objects or facts about the world
  - They are both often represented by nouns in descriptions
- General guidelines
  - Entities can have attributes but attributes have no smaller parts
  - Entities can have relationships between them, but an attribute belongs to a single entity

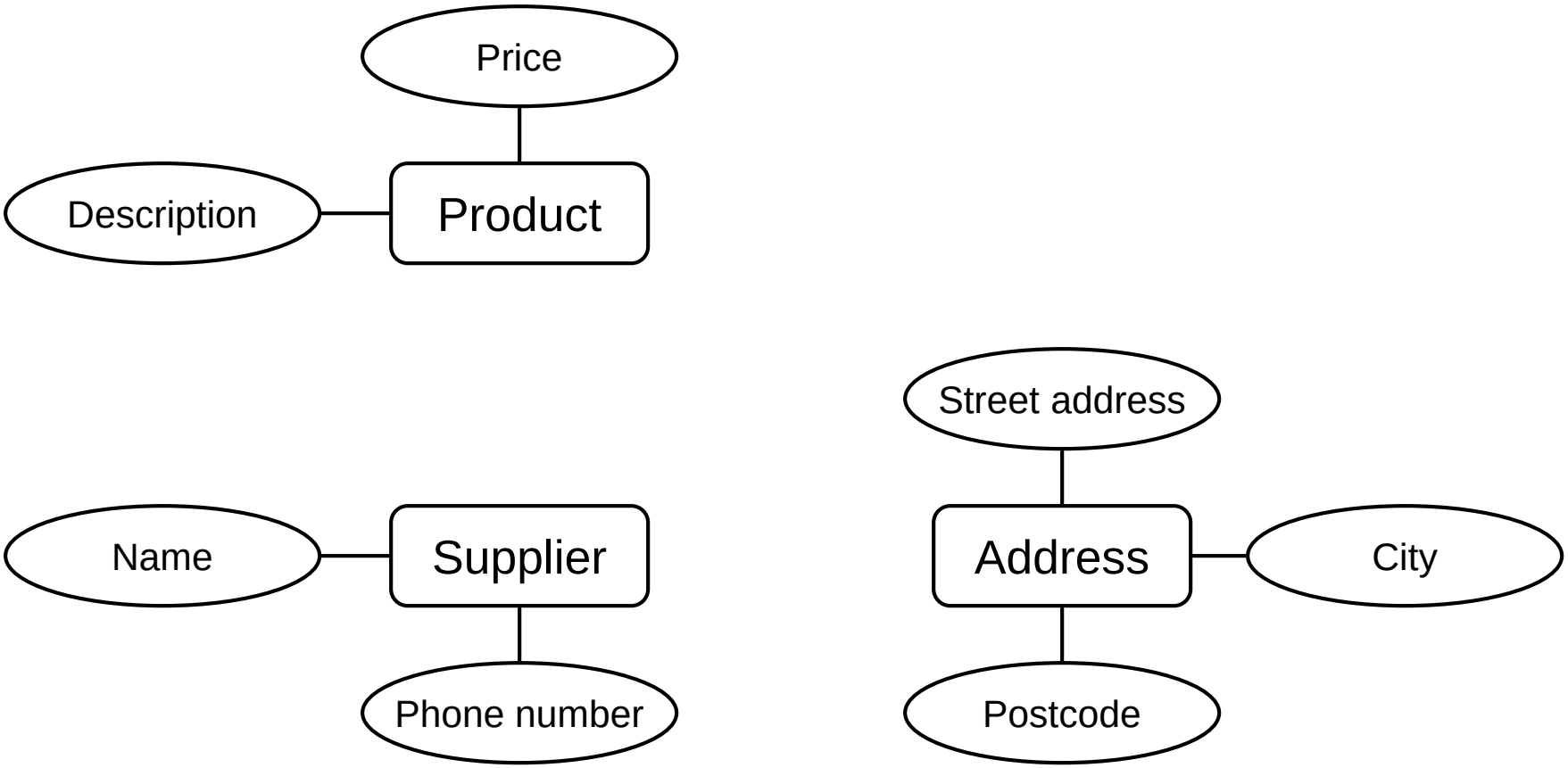
Example

We want to represent information about products in a database. Each product has a description, a price and a supplier. Suppliers have addresses, phone numbers, and names. Each address is made up of a street address, a city, and a postcode.

Example - Entities/Attributes

- Entities or attributes:
  - product
  - description
  - price
  - supplier
  - address
  - phone number
  - name
  - street address
  - city
  - postcode
- Products, suppliers, and addresses all have smaller parts so we can make them entities
- The others have no smaller parts and belong to a single entity

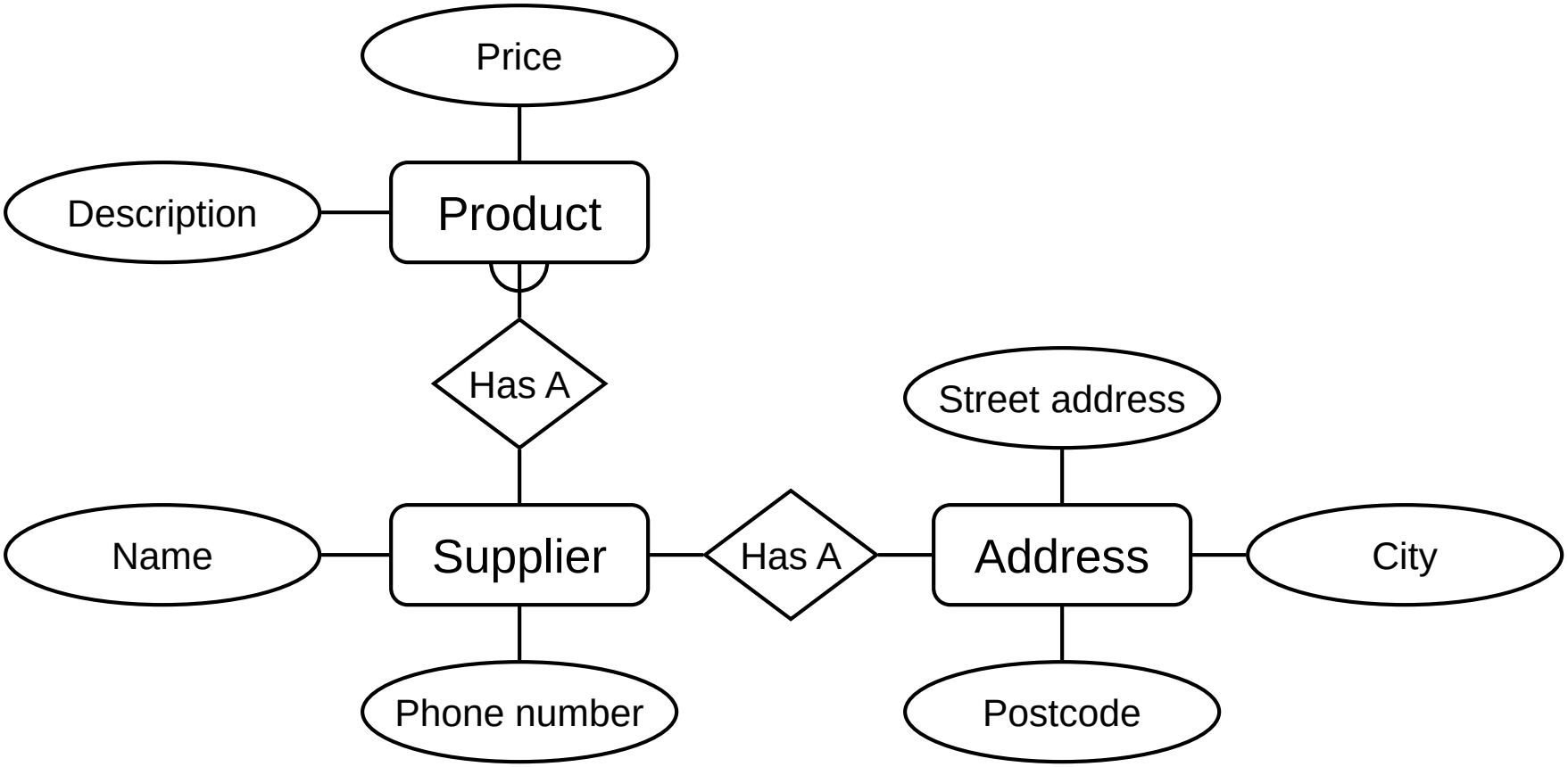
Example - E/R Diagram



Example - Relationships

- Each product has a supplier
  - Each product has a single supplier but there is nothing to stop a supplier supplying many products
  - A many to one relationship
- Each supplier has an address
  - A supplier has a single address
  - It does not seem sensible for two different suppliers to have the same address
  - A one to one relationship

Example - E/R Diagram

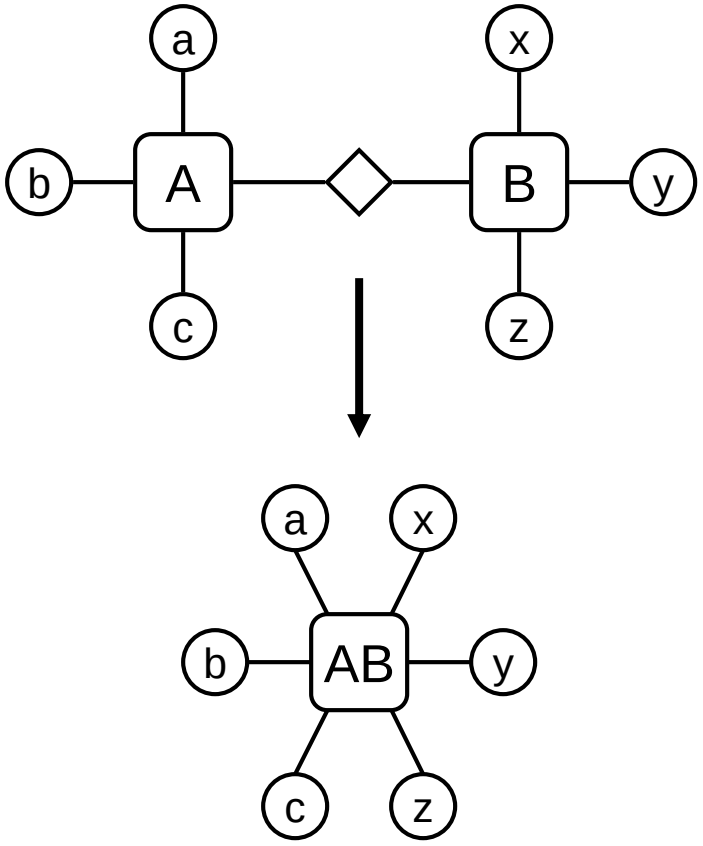


One to One Relationships

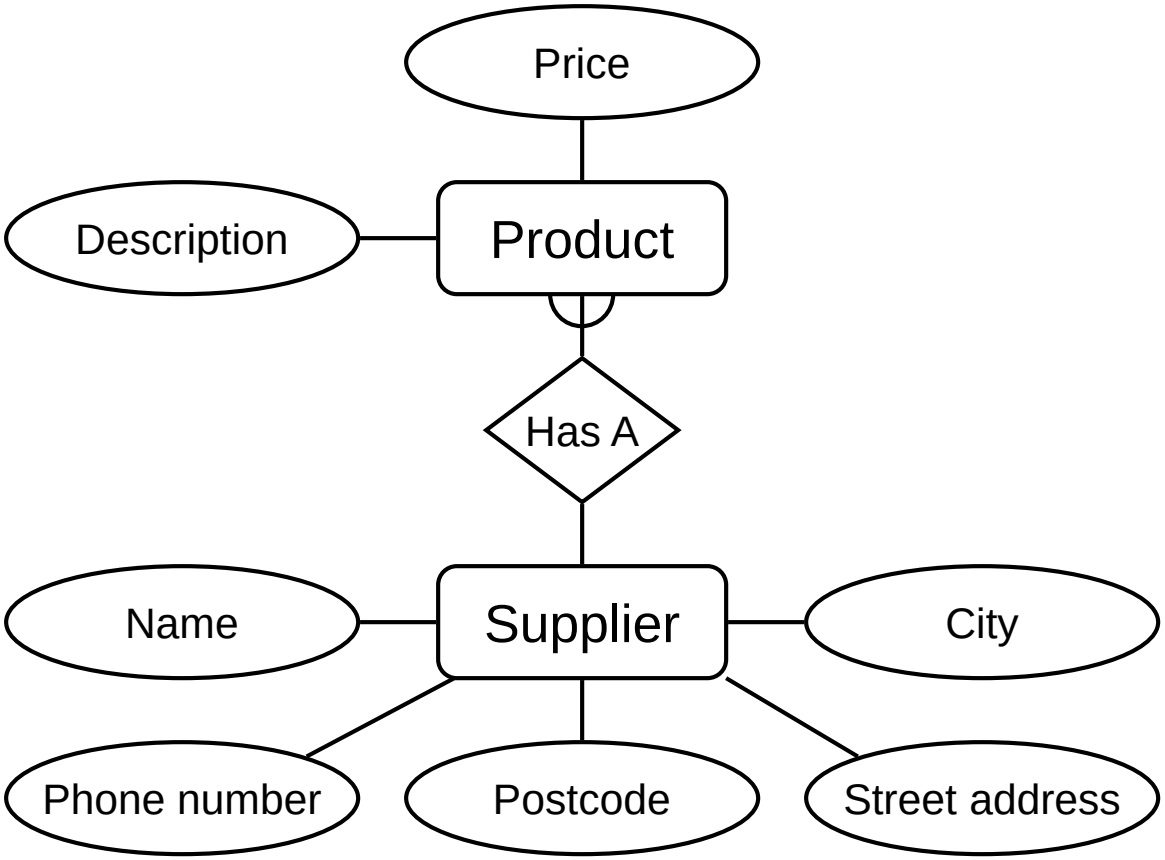
- **Some** relationships between entities, A and B, **might** be redundant if
  - It is a 1:1 relationship between A and B
  - Every A is related to a B and every B is related to an A
- Example - the supplier-address relationship
  - Is one to one
  - Every supplier has an address
  - We don't need addresses that are not related to a supplier

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



Example - E/R Diagram



Making E/R Diagrams

- From a description of the requirements identify the
  - Entities
  - Attributes
  - Relationships
  - Cardinality ratios of the relationships
- Draw the E/R diagram and then
  - Look at one to one relationships as they might be redundant
  - Look at many to many relationships as they might need to be split into two one to many links

ER and Enterprise information flow

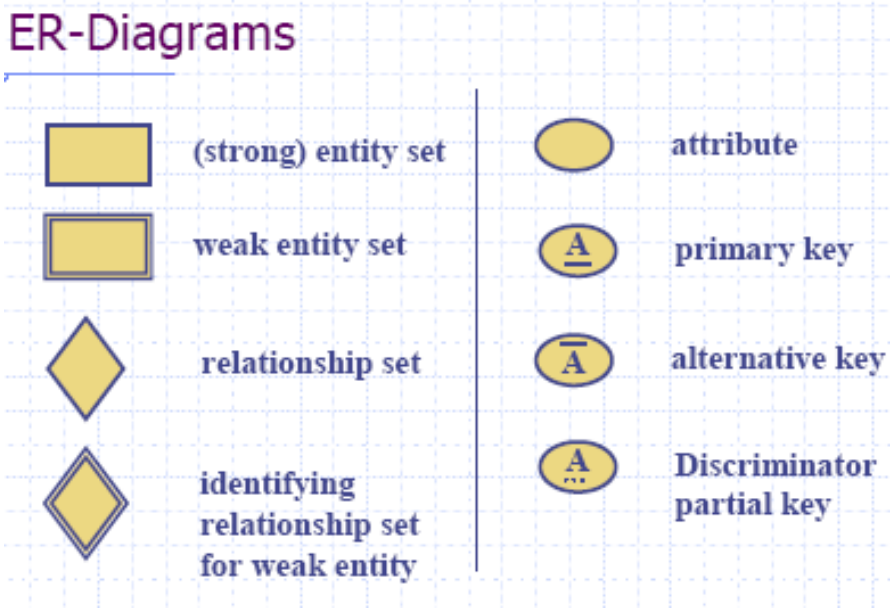
- ERD and enterprise hierarchies ?
- How to map enterprise hierarchies in an ERD ?
- What is the major source of information ? and how it can be captured ?
- How many entities and relationships are mandatory for an ERD?
- IS an ERD is formal representation ?
- How to standardized an ERD ?

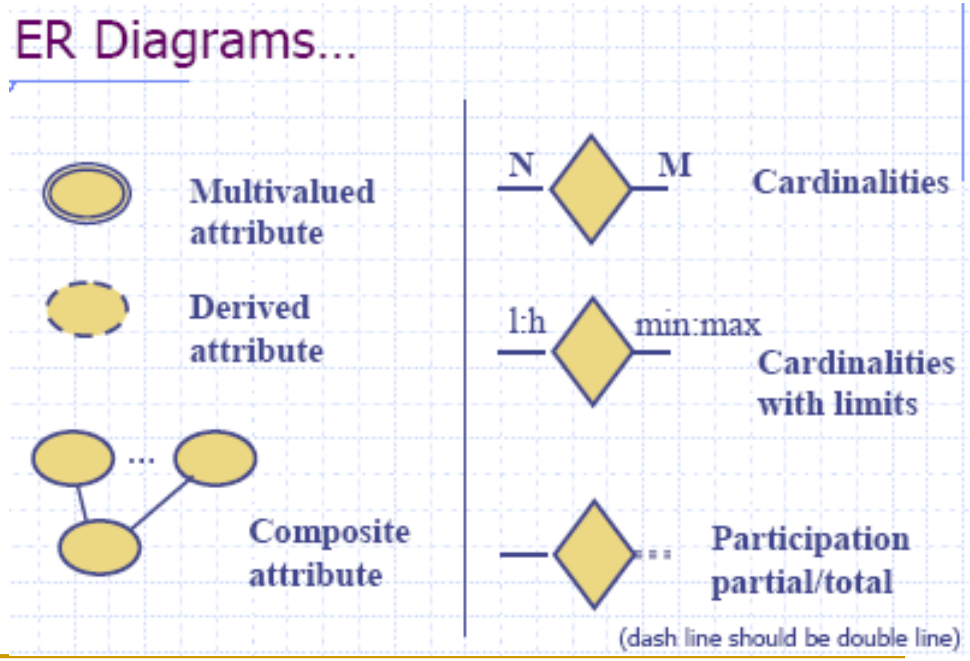
Classification of entities

- 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

Quiz ERD in next lecture

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)

In Next Lecture

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

Thanks