7BUIS030W
Data System Concepts and Fundamentals

Lecture -4

Lecture-4 Outline

Phases of Database design, Data modelling and Conceptual Database Design, Entity-Relationship modelling: entities, strong and weak entities, attributes, relationships, multiplicity, degree of relationships, complex relationships

Three Phases of Database Design

Conceptual database design.

- Construct a model of the data used in a firm, independent of all physical considerations.

Logical database design.

Construct a model of the data used in a firm

- based on specific data organisation (e.g. relational schema)
- independent of DBMS & other physical considerations.

Physical database design & implementation.

- Produce description of the DB implementation for DBMS
- Create base relations, file organizations and indexes
- Create any integrity constraints and security measures.

Strong and weak entities

- Entities can be classified as strong and weak entities.
- **Strong entity**: The entity with an existence that does not depend on the existence of any other entity in a schema.
- The strong entity always has a primary key in the attributes which uniquely identifies it.

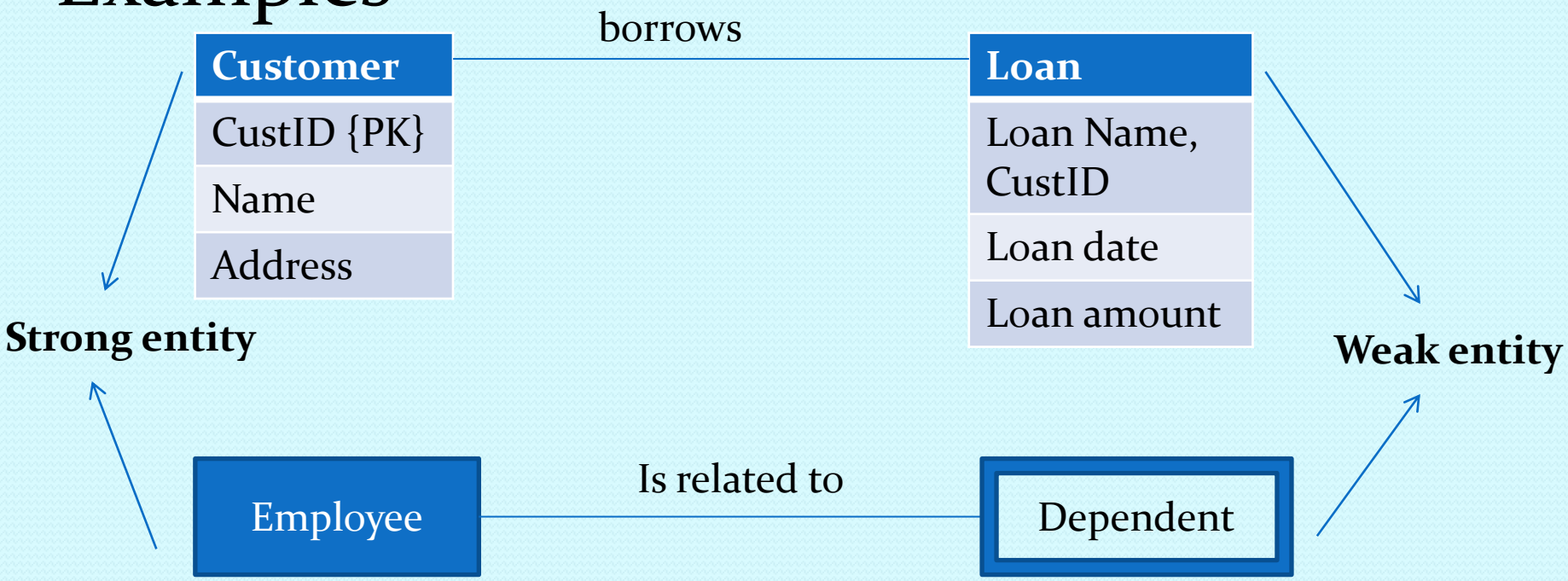
Strong and weak entities

Entities can be classified as strong and weak entities.

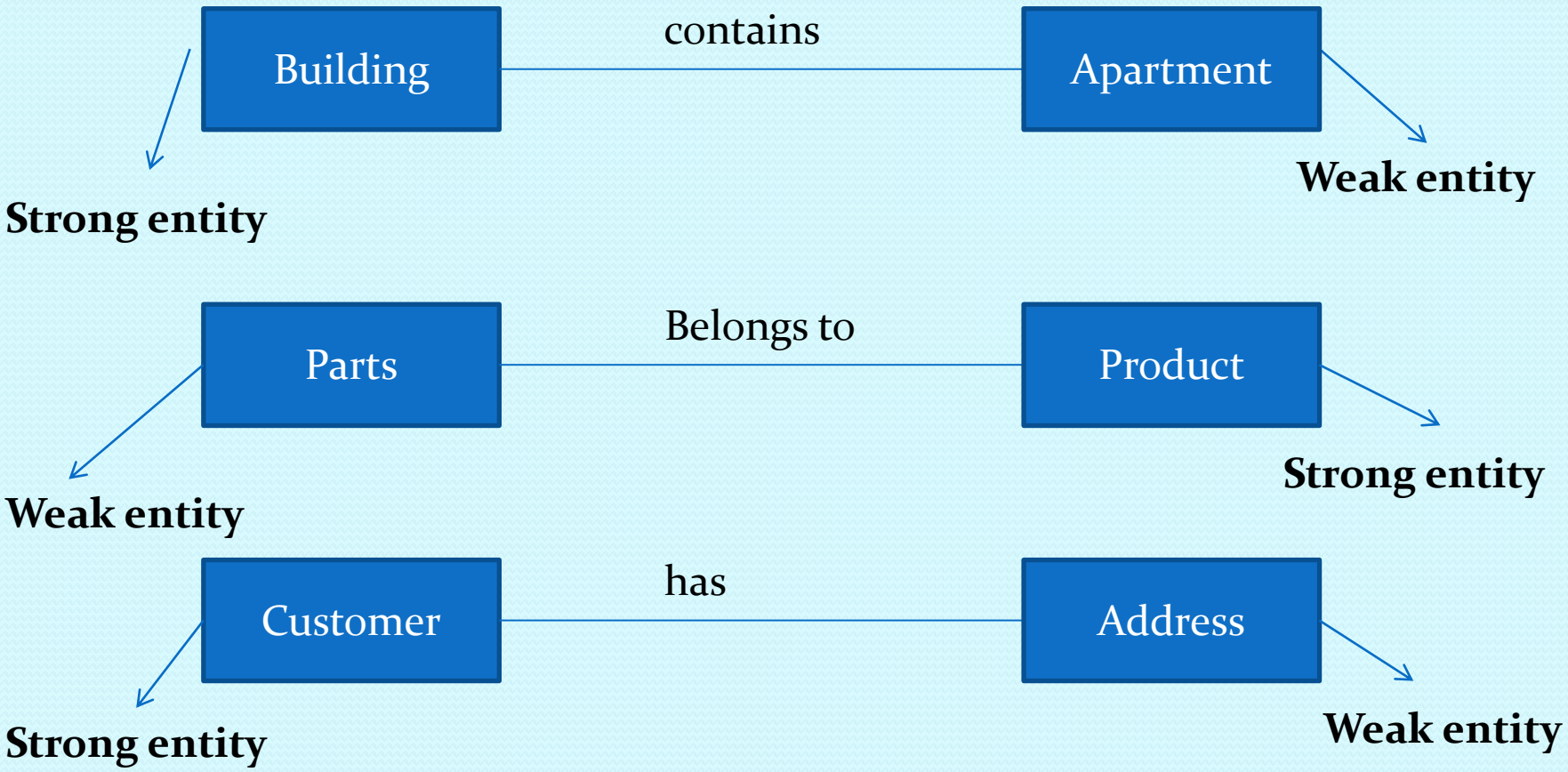
- **Weak entity**: Weak entity depends on the strong entity for its existence.
- The weak entity has a partial discriminator key in the attributes which is not a primary key that uniquely identifies it.

Strong and weak entities

Examples



Identify the strong and weak entities



Degree of a relationship

- **Degree of a Relationship**
  - Number of participating entities in relationship.

- **Relationship of degree :**
  - two is binary: most common
  - three is ternary
  - four is quaternary
  - n is n-ary.

Binary Relationship

Binary Relationship

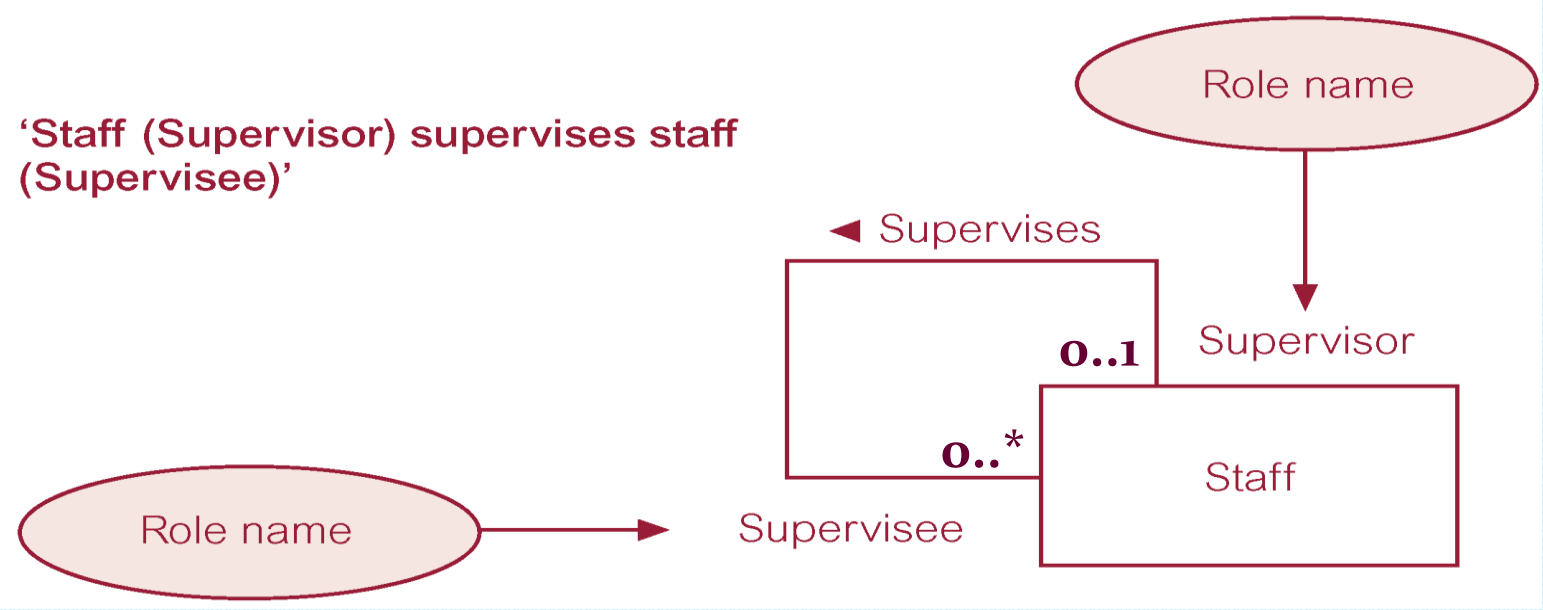
A binary relationship is when two entities participate, and is the most common relationship degree

Recursive Relationships

Recursive Relationship

Relationship where same entity participates more than once in different roles.

Relationships may be given role names to indicate purpose that each participating entity plays in a relationship.

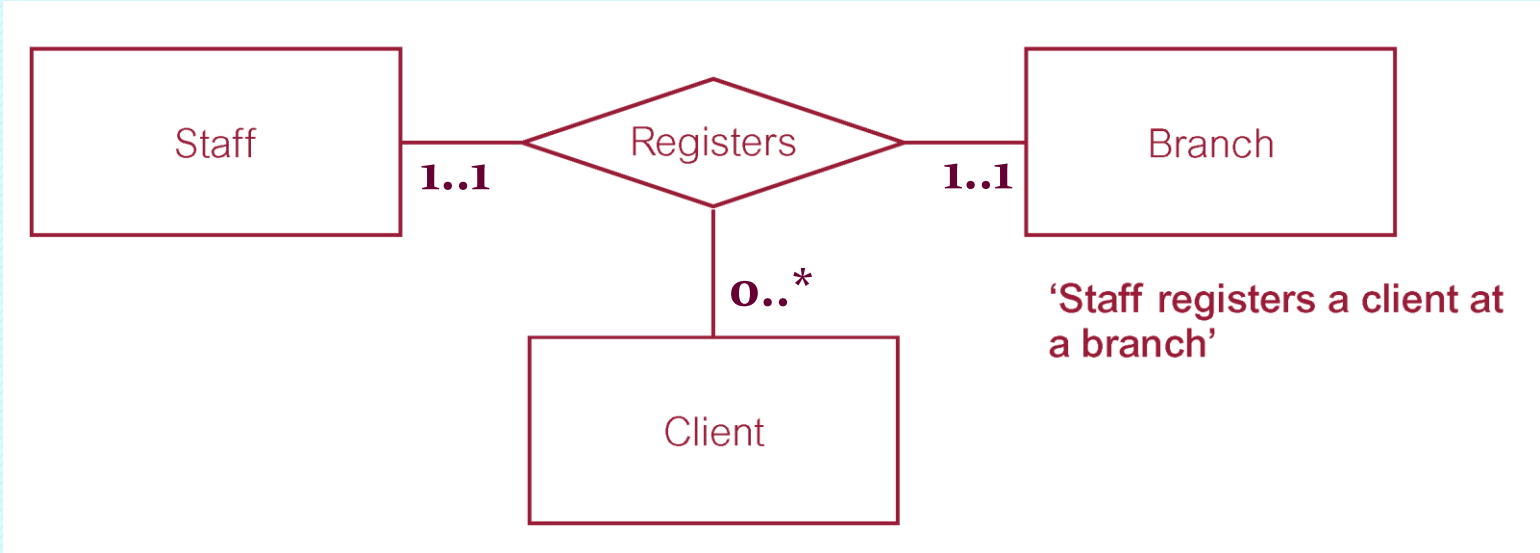


Ternary Relationship

Ternary Relationship

A ternary relationship is when three entities participate in the relationship.

Example: a banking organization must record the details of staff registering clients in branches



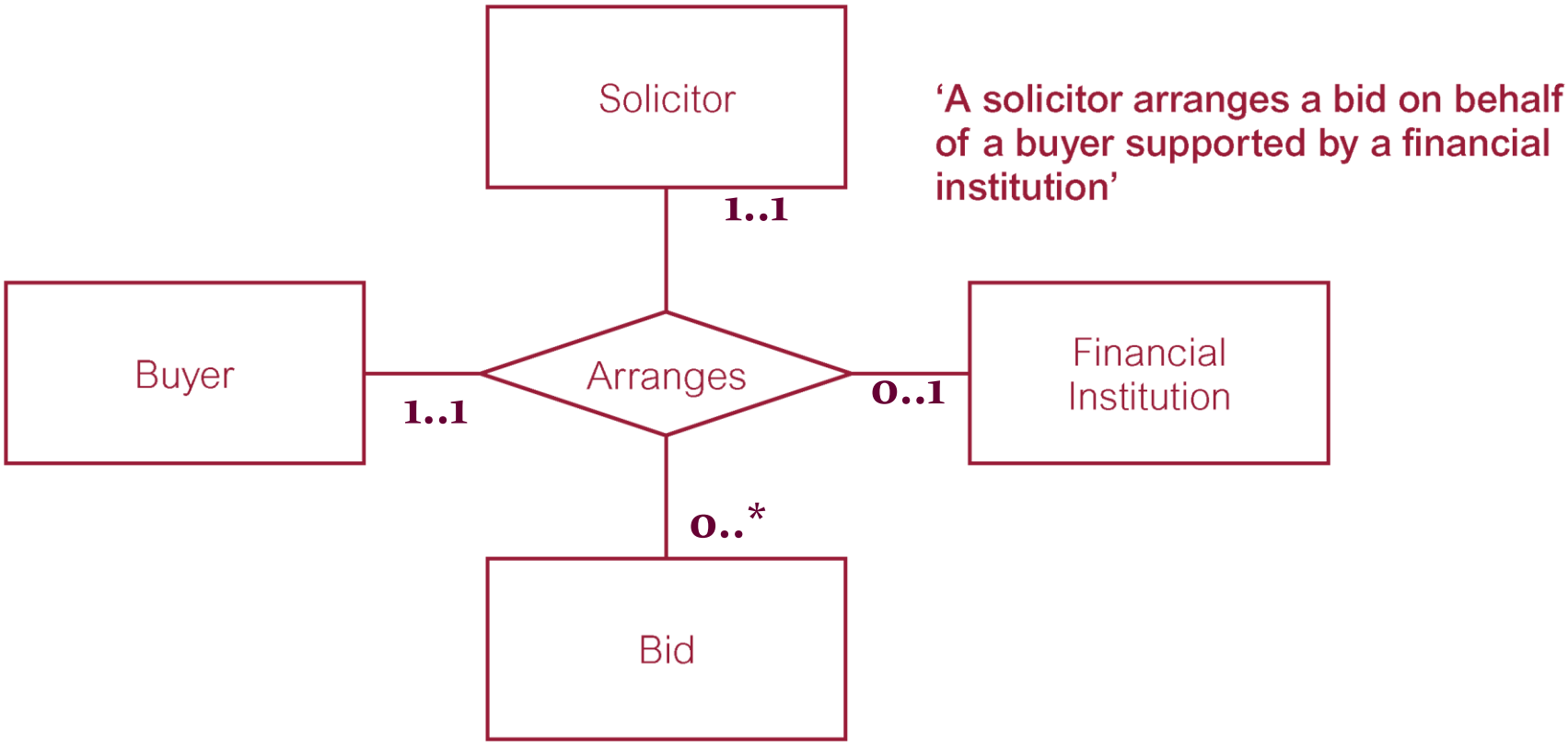
Quaternary Relationship

Quaternary Relationship

A quaternary relationship is when four entities participate in the relationship.

Example: a financial institution supports bids arranged by solicitors on behalf of respective clients

Quaternary Relationship



Exercise:

- Identify the degree of relationship and establish the multiplicities

1. Lecturers deliver modules

Exercise:

- Identify the degree of relationship and establish the multiplicities

2. Some modules may be prerequisites for other modules

Exercise:

- Identify the degree of relationship and establish the multiplicities

3. The teachers deliver various modules that belongs to respective courses

Exercise:

- Identify the degree of relationship and establish the multiplicities

4. The students take up modules using a particular Course-Material under a particular Teacher.