

E/R Diagrams Day 2: Review

- Entity sets (rectangles)
- Attributes (ovals)
- Relationships (diamonds connecting entity sets)
- Multiplicity of relationships (arrows)
- Running examples: BannerWeb-style DB, Amazon DB

Attributes on relationships

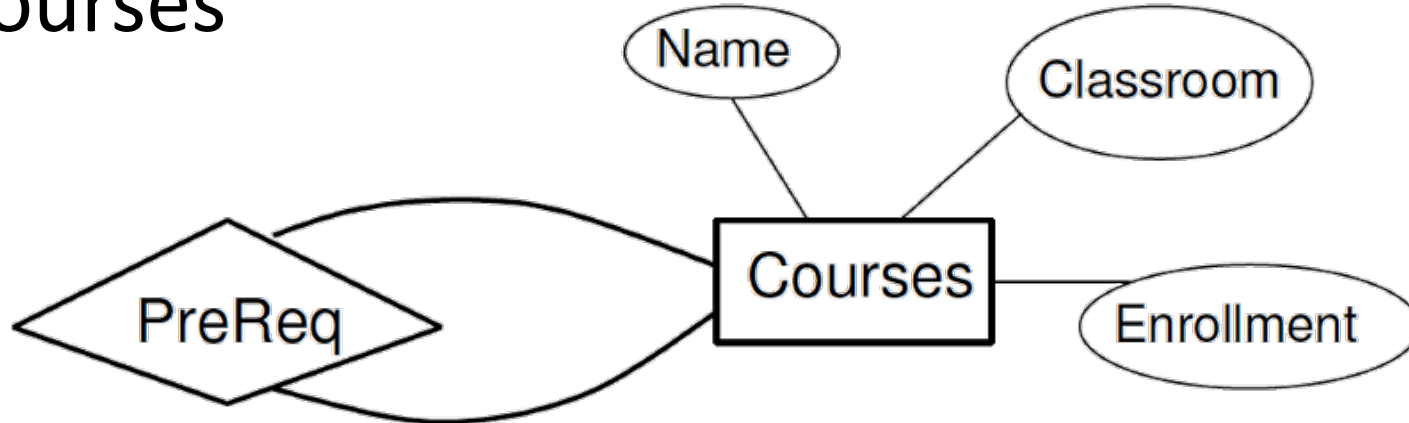
- Attributes can also be placed on a relationship, as well as on an entity set.
- Only necessary if the attribute cannot be determined from a single entity instance.
- Example:
 - Students and Courses: where do we store grades?

Multiway relationships

- Rare
- An arrow pointing to entity set E means if we select one entity from each of the other entity sets in the relationship, those entities are related to (at most/exactly) one entity in E .
- *Multiway relationships can often be converted into multiple binary relationships. (later)*

Roles in Relationships

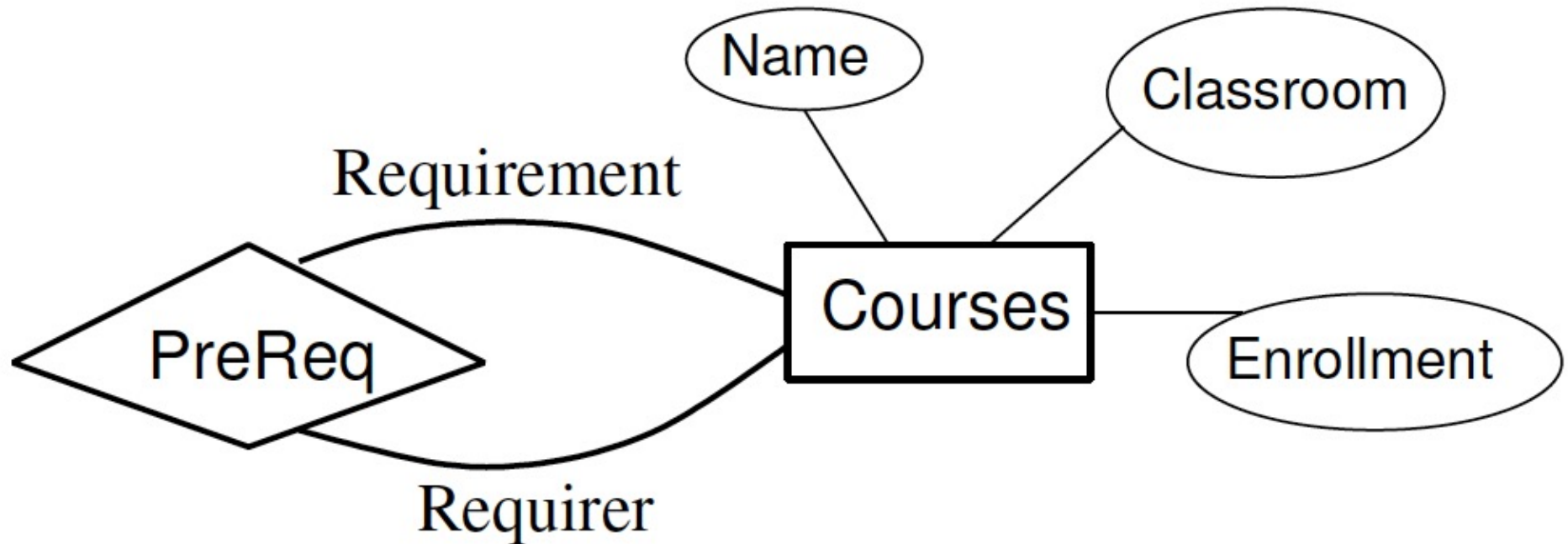
- Can the same entity set appear more than once in the same relationship?
- Prerequisite relationship between two Courses



- But which course is the pre-req?

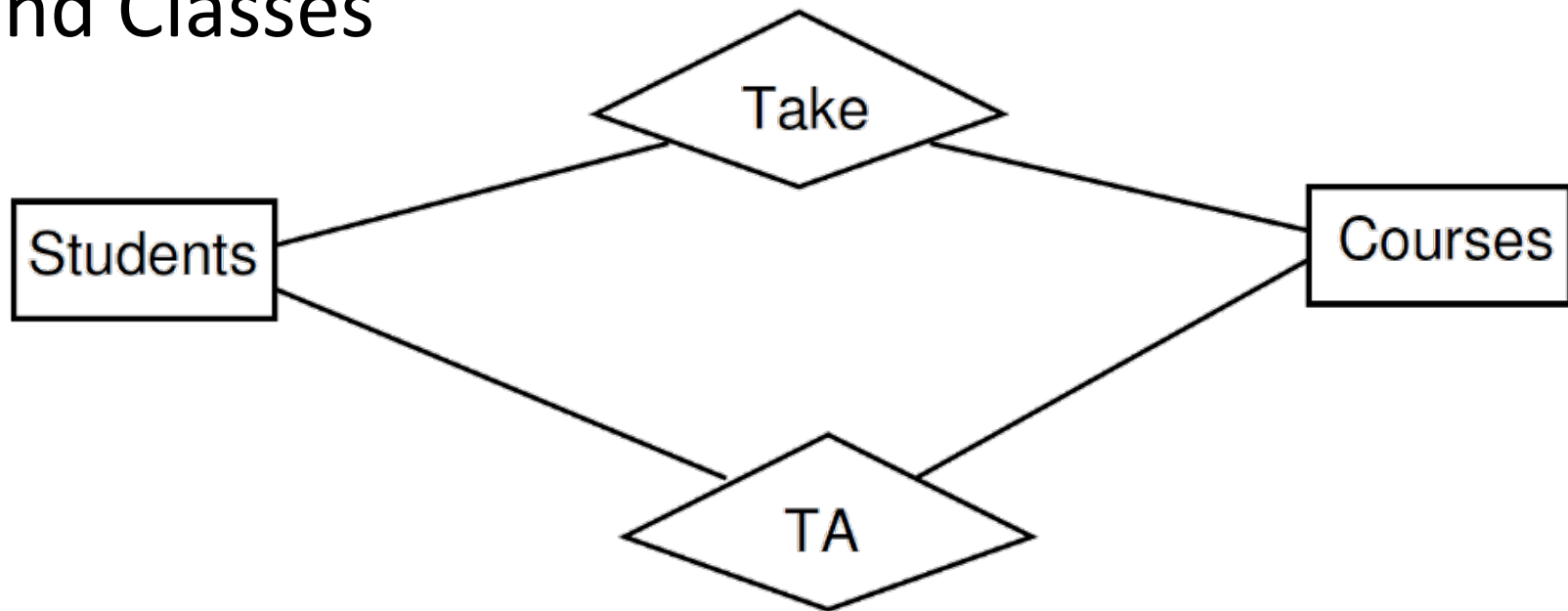
Roles in Relationships

- Label the connecting lines with the *role* of the entity



Parallel Relationships

- Can there be more than one relationship between the same pair of entities?
- TA and Take relationship between Students and Classes



Converting Multiway to Binary

- It is easy to convert a multiway relationship to multiple binary relationships
 - Create a new ***connecting entity set***. Think of its entities as the tuples in the relationship set for the multiway relationship
 - Introduce many-one relationships from the connecting entity set to each of the entities in the original relationship
 - If an entity set plays > 1 role, create a relationship for each role

Try this

- Partners or triples.
- Design an E/R diagram for a bank, including info about customers and accounts.
- Customer info: name, addr, phone, SSN.
- Account info: type (checking/savings), balance.
- Accounts may have multiple customers; customers may have multiple accounts.

Try this

- What if an account can have only one customer?
- What if a customer can have only one account?
- What if a customer can have multiple addresses and multiple phones?
- (Think pre-cell-phones) What if we want to associate phones with addresses?

Is-A Hierarchies (Subclasses)

- Certain entities might need to store special properties that not all entities possess.
- Create two entity sets: a “super-entity” and a “sub-entity” and connect them with a Is-A relationship (triangle instead of diamond).

Good design principles (4.2)

- Faithfulness
 - Entity sets & attributes should reflect reality in choice of attributes and multiplicity of relationships.
 - The real-world situation can dictate what faithfulness means.
 - E/R diagram cannot convey all the information.
 - Consider Students/Courses/Profs & multiplicity – can be different ways to do this diagram.

Good design principles

- Avoid redundancy
 - Watch out for an attribute duplicating a relationship.
- Choosing the right relationships
 - Does every relationship express all the information you need it to express?

Good design principles

- Picking an attribute or entity set
- Replace E by an attribute when
 - All relationships involving E must have arrows entering E.
 - If E has >1 attribute, then no attribute depends on any other attribute.
 - No relationship involves E more than once.