Binary vs. Ternary Relationships

If each policy is owned by just 1 employee:

*Key constraint on Policies would mean policy can only cover 1 dependent!*

Think through *all* the constraints in the 2nd diagram!

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Binary vs. Ternary Relationships (Contd.)

- Previous example illustrated case when two binary relationships were better than one ternary relationship.
- Opposite example: a ternary relation *Contracts* relates entity sets *Parts, Departments* and *Suppliers*, and has descriptive attribute *qty*. No combination of binary relationships is an adequate substitute.
Binary vs. Ternary Relationships

- A Supplier can be authorized to supply certain Parts (Office Depot can supply pens)
- A Department needs particular Parts (Department 14 needs pens)
- A Supplier can be work with certain Departments (Office Depot supplies Department 14)

THUS: Office Depot can supply pens to Department 14

Binary Relationships (Cont.)
A ternary relationship means that a particular Supplier must be authorized to supply a particular Part to a particular Department.

Thus...if the only relationships we knew were:

- Office Max can supply computer to Department 12
- Office Depot can supply pencil sharpener to Department 12
- Staples can supply computer to Department 12

THEN Office Depot could NOT supply a computer to Department 12 even though:

- Office Depot has computers
- Department 12 needs computers
- Office Depot supplies other things for Department 12 (sharpener)
ISA (‘is a’) Hierarchies

- If we declare A ISA B, every A entity is also considered to be a B entity.

Overlap constraints: Can Simon be an Hourly_Emps as well as a Contract_Emps entity?  (Allowed/disallowed)

Covering constraints: Does every Employees entity also have to be an Hourly_Emps or a Contract_Emps entity? (Yes/no)

Reasons for using ISA:
- To add descriptive attributes specific to a subclass.
  - i.e. not appropriate for all entities in the superclass
- To identify entities that participate in a particular relationship
  - i.e., not all superclass entities participate
Aggregation

- Used to model a relationship involving a relationship set.
- Allows us to treat a relationship set as an entity set for purposes of participation in (other) relationships.

Aggregation vs. ternary relationship?
- Monitors is a distinct relationship, with a descriptive attribute.
- Also, can say that each sponsorship is monitored by at most one employee.

Conceptual Design Using the ER Model

- ER modeling can get tricky!

  **Design choices:**
  - Should a concept be modeled as an entity or an attribute?
  - Should a concept be modeled as an entity or a relationship?
  - Identifying relationships: Binary or ternary? Aggregation?

  **Note constraints of the ER Model:**
  - A lot of data semantics can (and should) be captured.
  - But some constraints cannot be captured in ER diagrams.
    - We’ll refine things in our logical (relational) design
Entity vs. Attribute

- Should address be:
  - attribute of Employees or
  - an entity (related to Employees)?

- Depends upon use of address information, and the semantics of the data:
  - If several addresses per employee, address must be an entity.
  - If structure (city, street, etc.) is important, address must be modeled as an entity.

Entity vs. Attribute (Cont.)

- Works_In2 does not allow an employee to work in a department for two or more periods.

- Similar to the problem of wanting to record several addresses for an employee: we want to record several values of the descriptive attributes for each instance of this relationship.
Exercise 2.5: In Text

- Each musician has a SSN, a name, an address and a phone number. Musicians may have the same address, but no address has more than one phone.
- Each instrument has a name and a musical key
- Each album has a title, a copyright, a format, and an album identifier.
- Each song has a title, an author, and a song identifier.
- Each musician may play several instruments, and a given instrument may be played by several musicians.
- Each album has a number of songs on it, but no song may appear on more than one album.
- Each song is performed by one or more musicians, and a musician may perform a number of songs.
- Each album has exactly one musician who acts as its producer. A musician may produce several albums.