

SEPTEMBER 9 2021, DATA AND APPLICATIONS LECTURE 6

ENHANCED ER MODEL

Specialization

Grants support for **is-a** relationships in ER models. It is the process of turning a very general entity into many specialized entity types. Entities will be a subset of one parent entity in a superclass-subclass relationship. The is-a relationship allows for the creation of specialized attributes in subclasses eg. EngrType attribute for an engineer which *is an* employee.

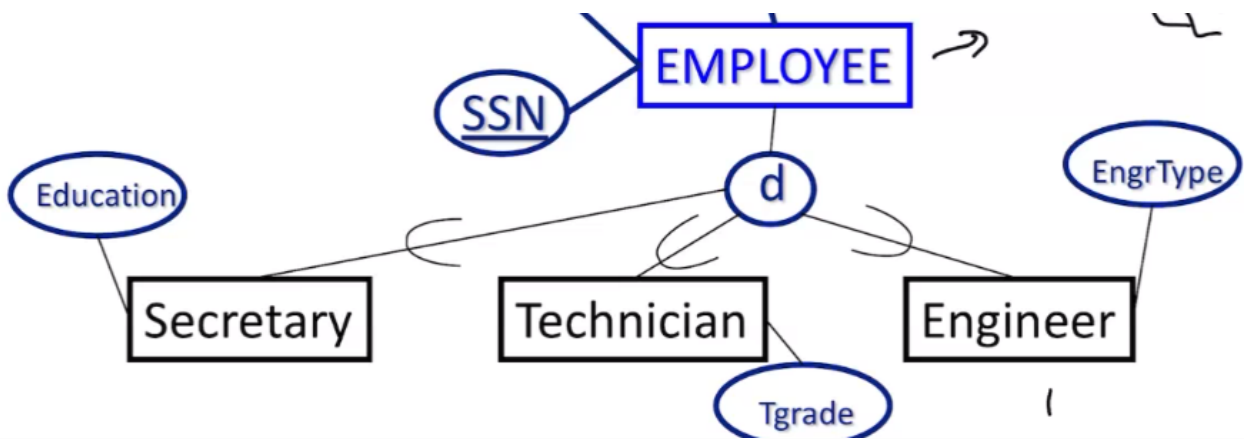
the **d** in a circle means "**disjoint**". No subclass will be a part of more than one subclass in a disjoint relationship.

the **o** in a circle means "**overlap**". Subclasses can be a part of many subclasses.

Partial participation means that there are entities in the parent class that aren't a part of any subclass.

Total Participation implies that every entity in a superclass are a part of at least one subclass.

Subclasses can't just be other entity types. If this is the case, not only are the common superclass entity types repeated for each entity type. And the semantics of, say, Secretary being an Employee is lost.



Generalization

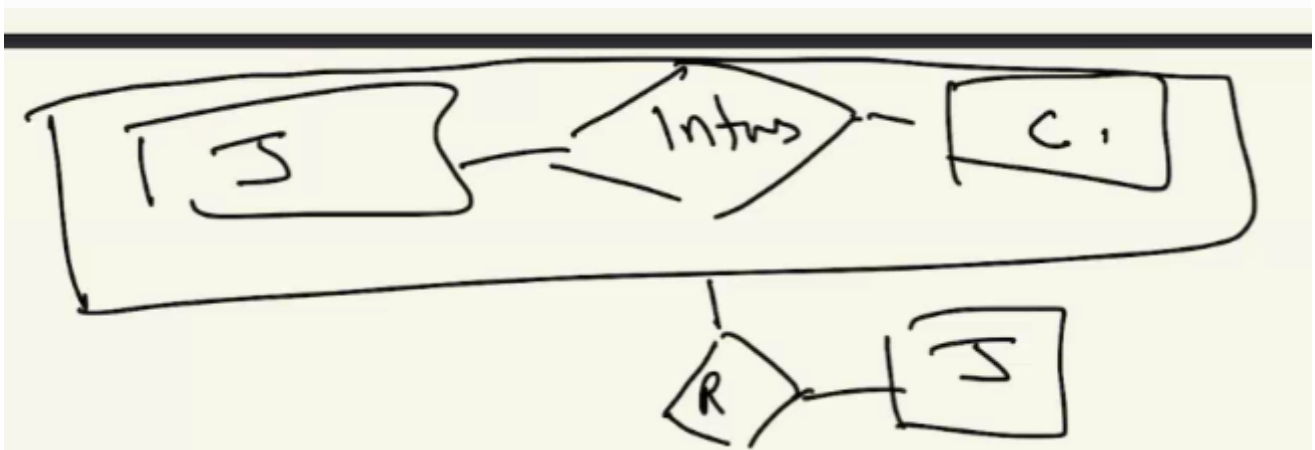
It is the process of strong entity types that share relationships and attributes being generalized into a single superclass entity type.

Similar to specialization, generalizations can be disjoint and overlapping and can have total and partial participation.

Aggregation

It is the concept that some objects are **made of** some other objects.

Job Applicant interviews for a Company and only some of these interviews result in a Job. Thus the Interview binary relation needs to be treated as a single entity for partial participation since not all interviews result in a job.




A weak entity for Interview can be created with two identifying relationships to Job Applicant and Company. And this entity is an aggregation of the other two entities.

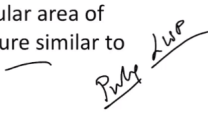
Data Abstraction and Knowledge Representation

- Classification and instantiation defines objects as an instance of classes.
- Identification makes objects or uniquely identifiable.
- Specialization and Generalization represents the knowledge of hierarchies in classes.
- Aggregation and Association represents an *is part of* or *is associated with* relationship.
- Ontology is basically a conceptual schema that has more rules and exceptions.

Examples of Ontology



- ♦ **Thesaurus – dictionary – glossary**: describes relationships between words that represent various concepts
- ♦ **Taxonomy**: how concepts of particular area of knowledge are related using structure similar to specialization & generalization
- ♦ **Database Schema**
- ♦ **Logic theory**: propositional logic – predicate calculus, frames, etc.



- Semantic Webs attempt to create knowledge representation models for meaningful information exchanges.

Relations

They are, informally, tables of values with many attributes (columns) and tuples (rows).

Eg. STUDENT(Name, StudentID, Age, GPA)

Essentially,

$$r(R) = \{t_1, t_2, \dots, t_m\}$$

where t_m are tuples

- Ordering of tuples is not important
- Ordering of attributes is important