CS 1555
www.cs.pitt.edu/~nlf4/cs1555/
The EER-model
Enhanced ER model (EER model)

- The EER model introduced the concepts of superclass and subclass entity types in the ER model.
- MEMBER (superclass):
  - LIFE_MEMBER, REGULAR_MEMBER, and SEASON_MEMBER (subclasses)
- LIBRARIAN (superclass):
  - HEAD_LIBRARIAN, SALARY_LIBRARIAN, and HOURLY_LIBRARIANS (subclasses)
Why EER?

- How does this help us set up a database schema?
Can also help clarify relationships

- If only salary-librarians can belong to the librarian guild, then this can be expressed as:
  - BelongTo:<SALARY_LIBRARIAN, LIB_GUILD>
- Instead of:
  - BelongTo:<LIBRARIAN, LIB_GUILD>
Specialization, generalization, and inheritance

- **Specialization**
  - Identifying subclasses, and their distinguishing characteristics (attributes & relationships)
  - Top-down design

- **Generalization**
  - Aggregate entities to a superclass entity type by identifying their common characteristics
  - Bottom-up design

- **Inheritance**
  - IS_A (instance) relationship that supports attribute inheritance and relationship participation
  - Single inheritance results in a hierarchy
  - Multiple inheritance results in a lattice
    - E.g., EMPLOYEE → STUDENT-ASSISTANT ← STUDENT
The entities for each class can be user-defined or specified with a condition on attributes of from the superclass.

- In a predicate-defined subclass, we use a selection condition on one or more attributes to define the entities of the subclass.
- Attribute-defined specializations occur when the same attribute of the superclass is used to determine membership in all subclasses (e.g., MembershipType).
Inclusion constraint classifications

- Disjoint constraints
  - The subclasses of a superclass are disjoint.
    - This means that an entity can be a member of only one subclass.

- Overlapping constraints
  - Specify that the subclasses are overlapping and an entity may be a member of more than one subclass.
Completeness constraints

- **Total specialization**
  - Specifies that every entity in the superclass must be a member of some of its subclasses
  - E.g., a librarian must belong to one of the subclasses of LIBRARIAN

- **Partial specialization**
  - Specifies that an entity may not belong to any subclass
  - E.g., an honorary member may not belong to any of the specializations (subclasses) of MEMBER

- **Superclass via generalization is always total**
Union types (or categories)

- Collection of entities of distinct entity types
  - A vehicle owner could be a person, a bank, or a company
- Multiple Inheritance with superclasses of different types
- Category OWNER is a subclass of the set union of the entity types: PERSON, BANK, COMPANY
- An instance in category must exists only in one of the superclasses
- Category can be
  - Total
  - Partial (with predicate definition)