E-R Model

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Data Models

- Data modeling is a way of expressing our perception of the world. Our choices are definitions.
- Data Modeling Language: specific syntax for expressing our definitions.
- Two data models covered in this course:
  - Relational model: low-level model close to physical storage in DBMSs.
  - Entity-Relationship model: graphical, and (slightly) more high-level. Standard DB development: model in this and then “compile” (manually) to relational model.

E-R Model

The Entity-Relationship Model: [Chen, 1976]

- Conceptual data model widely used in DB area.
- Simple:
  - Entities ($\sim$ objects).
  - Relationships between entities ($\sim$ tuples of entities).
  - Entities and relationships can have attributes (simple types/domains: integers, strings, booleans...).
- Graphical version: E-R diagrams.
- There are standard ways to convert to relational model (discussed later).

Note: different variations of E-R model exist.

Constraints Expressible in the E-R Mode

- Key of entity set (minimal)
- Candidate key, primary key
- Arity of relationships
- Roles

Key constraints:

- One-to-one, one-to-many (many-to-one), many-to-many.

Participation Constraints:

- Total participation, partial participation.

Advanced Concepts in the E-R Model

- Weak entity sets
- ISA hierarchies (inheritance)
- Aggregations

Note Again

- Data modeling is a way of expressing our perception of the world. Our choices are definitions.
- Goals:
  - Capture as many aspects of real world as possible.
  - Avoid redundancy.
  - Do not be afraid of creating IDs for entities if necessary. May avoid many weak entity sets.
- It takes practice to do well.
- There can be several (good) solutions.
- E-R model (or any other model) cannot capture all semantics.
- Other data models can be used (e.g. UML, or modeling directly in the relational model).