Carnegie Mellon Univ.
Dept. of Computer Science
15-415 - Database Applications

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E-R diagrams

Overview
- concepts
  - Entities
  - Relationships
  - Attributes
  - Specialization/Generalization
  - Aggregation
- turning E-R diagrams to tables

Tools

Entities (“entity sets”)

Relationships (“rel sets”)
and mapping constraints

attributes

Example

Students, taking courses, offered by instructors; a course may have multiple sections; one instructor per course

nouns -> entity sets
verbs -> relationships

name

STUDENT

name

INSTRUCTOR

name

STUDENT

name

INSTRUCTOR

name
cid
course

COURSE

but: sections of course (with different instructors)?
Cardinalities

- 1 to 1 (example?)
- 1 to N
- N to M

More details

- "weak" entities if they need to borrow a unique id from a "strong" entity - DOUBLE box.
- 'c-id' + 's-id': unique id for SECTION
- discriminator (e.g., 's-id')
More details

- self-relationships - example?

More details

- 3-way and k-way relationships?

More details - attributes

- candidate key (e.g., ssn, employee#)
- primary key (a cand. key, chosen by DBA)
- superkey (e.g., (ssn, address))
- multivalued or set-valued attributes (e.g., "dependents" for EMPLOYEE)
- derived attributes (e.g., 15% tip)

More details:

- in the text: (e.g., "total participation")

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Specialization

- eg., students; part time (#credit-hours) and full time (major)

Observations

- Generalization: practically identical
- attribute inheritance
- could have IS-A hierarchy

Aggregation

- treat a relationship as an entity
- rarely used

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Strong entities

just list the attributes, and underline the primary key, eg,

STUDENT(ssn, name, address)
Relationships

- get primary keys all involved entities
- primary key - depends on cardinality
  - 1 to 1: either eg EMPLOYEE (ssn, name, ..)
  - 1 to N: the key of the "N" part eg.
    TEACHES(issn, cid, sid)
  - N to M: both keys - eg
    TAKES(ssn, cid, sid, grade)

Generalization/Special.

Two equally correct solutions:
- one table for each or
- no table for super-entity
  (pros and cons?)

Generalization/Special.

Eg,

STUDENT(ssn, name, address)
PT-STUDENT(ssn, num-credits)
FT-STUDENT(ssn, major)

Generalization/Special.

no super-entity:

STUDENT(ssn, name, address)
PT-STUDENT(ssn, num-credits)
FT-STUDENT(ssn, major)
Generalization/Special:

- no super-entity:
  - STUDENT (name, address)
  - PT-STUDENT (ssn, name, address)
  - FT-STUDENT (ssn, major, name, address)

Overview/Summary:

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