SWEN 220
Mathematical Models of Software

Entity Relationship Modeling Example
Simple Course Registration

A variant on the student registration system by T. Reichlmayr
Course Registration (Problem Statement)

Create an E-R model for a Course Registration system that comprises students, the courses they have completed and the course sections they are currently enrolled in. Students must adhere to course prerequisites.

For each completed course track the term it was completed and the grade received.

During a term, courses sections are taught by a teacher in a room at a designated meeting time.
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What are some candidate entities?
Look for the nouns!
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Blue = more likely to be relationships
Green = more likely to be attributes (though they might be entities)
Initial Cut at Attributes & Keys

- **Student**
  - collegeld (key)
  - name? address? email? major? phone?
- **Course**
  - department & number (compound key)
  - title? credit hours? description?
- **Section**
  - course department & course number & section number (compound key)
  - meeting time? meeting place? room capacity?
- **Teacher**
  - collegeld(key)
  - name? office? email? phone? department?
Initial Cut at Attributes & Keys
(our choices)

• Student
  – collegeld (key)
  – name / address / email. major? phone?

• Course
  – department & number (compound key)
  – title / credit hours. description?

• Section
  – course department & course number & section number (compound key)
  – meeting time / meeting place. room capacity?

• Teacher
  – collegeld(key)
  – name / office / email. phone? department?
Entity Diagrams

Student
- collegeld
- name
- email

Teacher
- collegeld
- email
- office
- name
- first
- last

Course
- dept
- cnum
- title
- hours

Section
- dept
- cnum
- room
- time
- snum

NOTE!!
Identify Relationships

- Students **Enroll** in Sections
- Students **Complete** Courses
- Courses **Offered** as Sections
- Courses **Require** prerequisite Courses
- Teachers **Teach** Sections

What about cardinality?
Identify Cardinalities

- Students **Enroll** in Sections \((M : N)\) (min 0 : 0)
- Students **Complete** Courses \((M : N)\) (min 0 : 0)
- Courses **Offered** as Sections \((1 : N)\) (min 1 : 0)
- Courses **Require** prerequisite Courses \((M : N)\) (min 0 : 0)
- Teachers **Teach** Sections \((1 : N)\) (min 1 : 0)
What's Missing?

• We need to record grades for completed courses.
• Attach as attributes of **Complete**.
• **Complete** defines each student's transcript.
Final ERD

Student
- collegeld
- email
- first
- last
- name

Course
- dept
- cnum
- title
- hours
- term
- grade

Complete
- M

Enroll

Offered
- M

Teacher
- collegeld
- email
- office
- first
- last
- name

Teach
- 1

Section
- dept
- cnum
- snum

Require
- N

Complete
- N

Offered
- N

Teacher
- 1

Section
- N

Student
- M

Course
- M

Complete
- N
Final ERD (simplified)