Translating Entity-Relationship to Relational Tables

School of Computer Science
University of Waterloo

CS 348
Introduction to Database Management
Fall 2007

E-R Diagram to Relational Schema

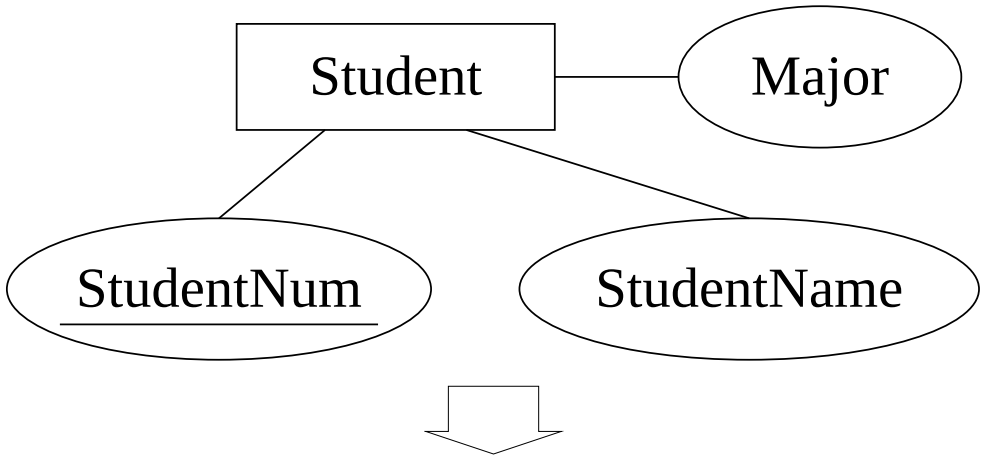
Main ideas:

- Each entity set maps to a new table
- Each attribute maps to a new table column
- Each relationship set maps to either new table columns or to a new table

Representing Strong Entity Sets

Entity set E with attributes $a_1, \ldots, a_n$ translates to table E with attributes $a_1, \ldots, a_n$

Entity of type $E \leftrightarrow$ row in table E
Primary key of entity set $\rightarrow$ primary key of table
Example:



Student

StudentNum	StudentName	Major

Representing Weak Entity Sets

Weak entity set E translates to table E

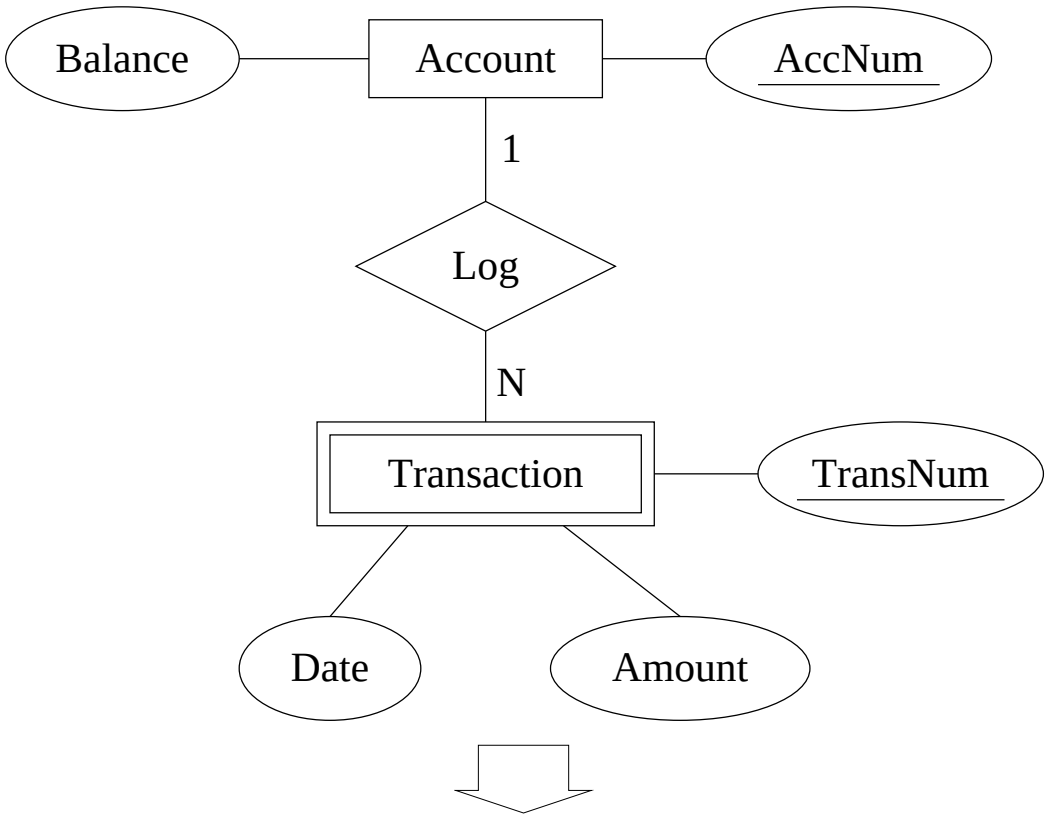
Columns of table E should include

- Attributes of the weak entity set
- Attributes of the identifying relationship set
- Primary key attributes of entity set for dominating entities

Primary key of weak entity set $\rightarrow$ primary key of table

Representing Weak Entity Sets (cont.)

Example:



Account

AccNum	Balance

Transaction

TransNum	AccNum	Date	Amount

Representing Relationship Sets

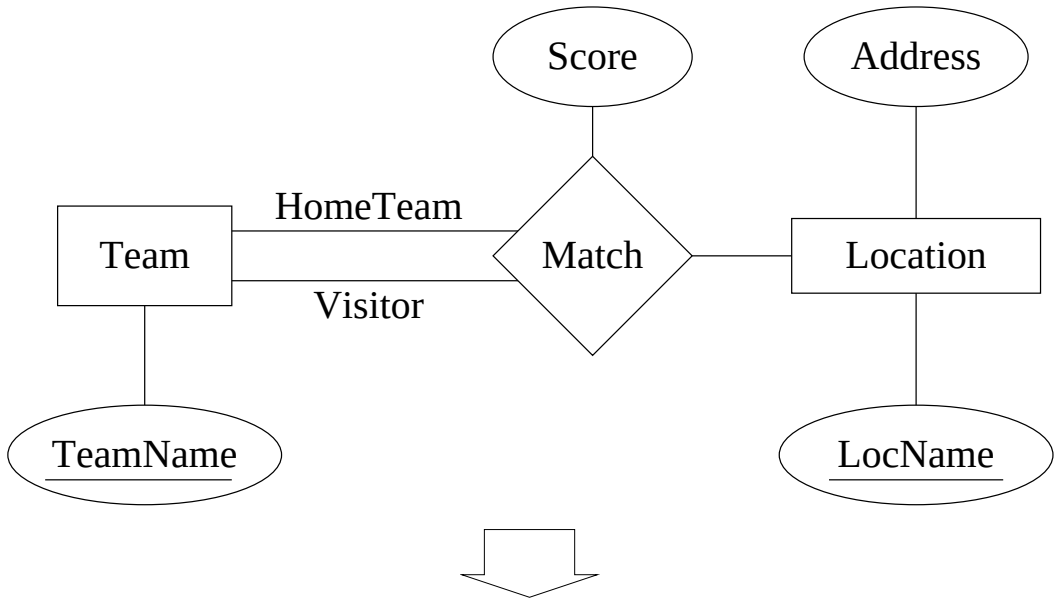
- If the relationship set is an identifying relationship set for a weak entity set then no action needed
- If we can deduce the general cardinality constraint (1,1) for a component entity set E then add following columns to table E
  - Attributes of the relationship set
  - Primary key attributes of remaining component entity sets
- Otherwise: relationship set $R \rightarrow$ table R

Representing Relationship Sets (cont.)

- Columns of table R should include
  - Attributes of the relationship set
  - Primary key attributes of each component entity set
- Primary key of table R determined as follows
  - If we can deduce the general cardinality constraint (0,1) for a component entity set E, then take the primary key attributes for E
  - Otherwise, choose primary key attributes of each component entity

Representing Relationship Sets (cont.)

Example:



Team

TeamName

Location

LocName	Address

Match

HomeTeamName	VisitorTeamName	LocName	Score

Note that the role name of a component entity set should be prepended to its primary key attributes, if supplied.

Representing Aggregation

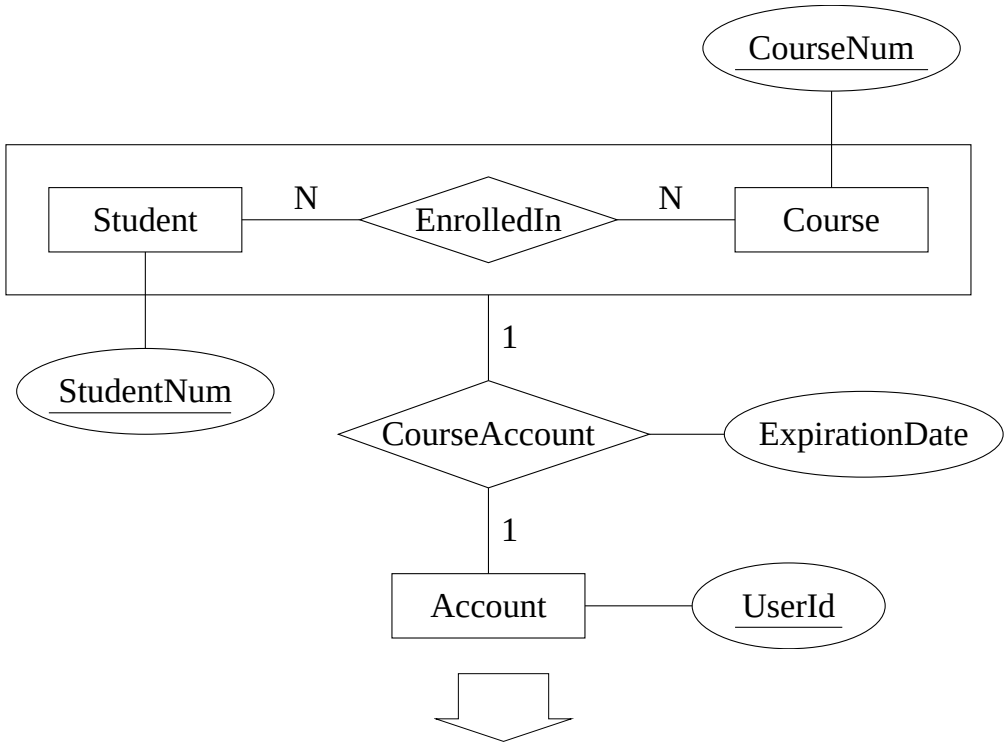
Tabular representation of aggregation of R

$$= \text{tabular representation for relationship set } R$$

To represent relationship set involving aggregation of R, treat the aggregation like an entity set whose primary key is the **primary key** of the table for R

Representing Aggregation (cont.)

Example:



Student

StudentNum

Course

CourseNum

Account

UserId

EnrolledIn

StudentNum	CourseNum

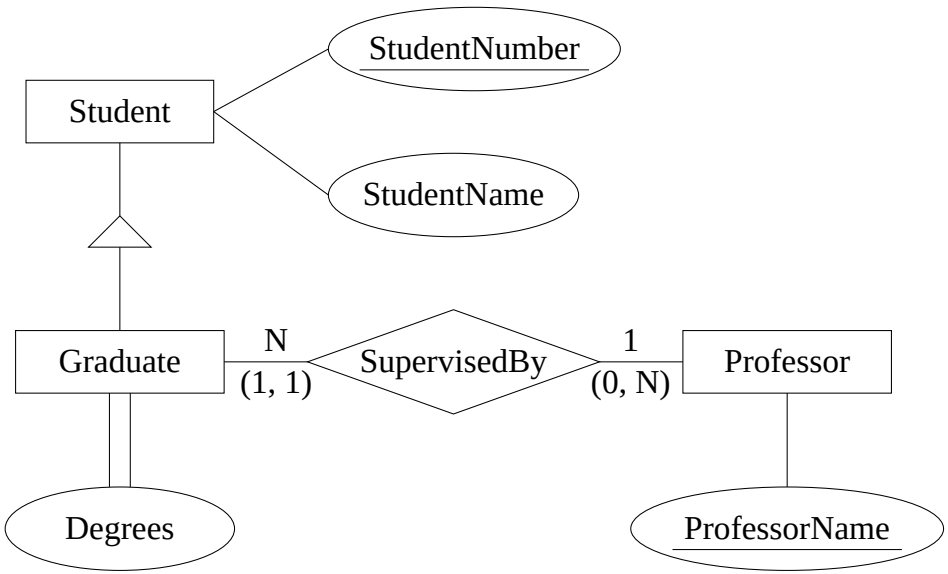
CourseAccount

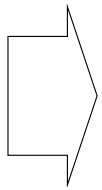
UserId	StudentNum	CourseNum	ExpirationDate

Representing Specialization

Create table for higher-level entity set, and treat specialized entity subsets like weak entity sets (without discriminators)

Example:





Student

StudentNumber	StudentName

Graduate

StudentNumber	ProfessorName

Degree

StudentNumber	Degree

Professor

ProfessorName

Representing Generalization (Approach #1)

Create a table for each lower-level entity set only

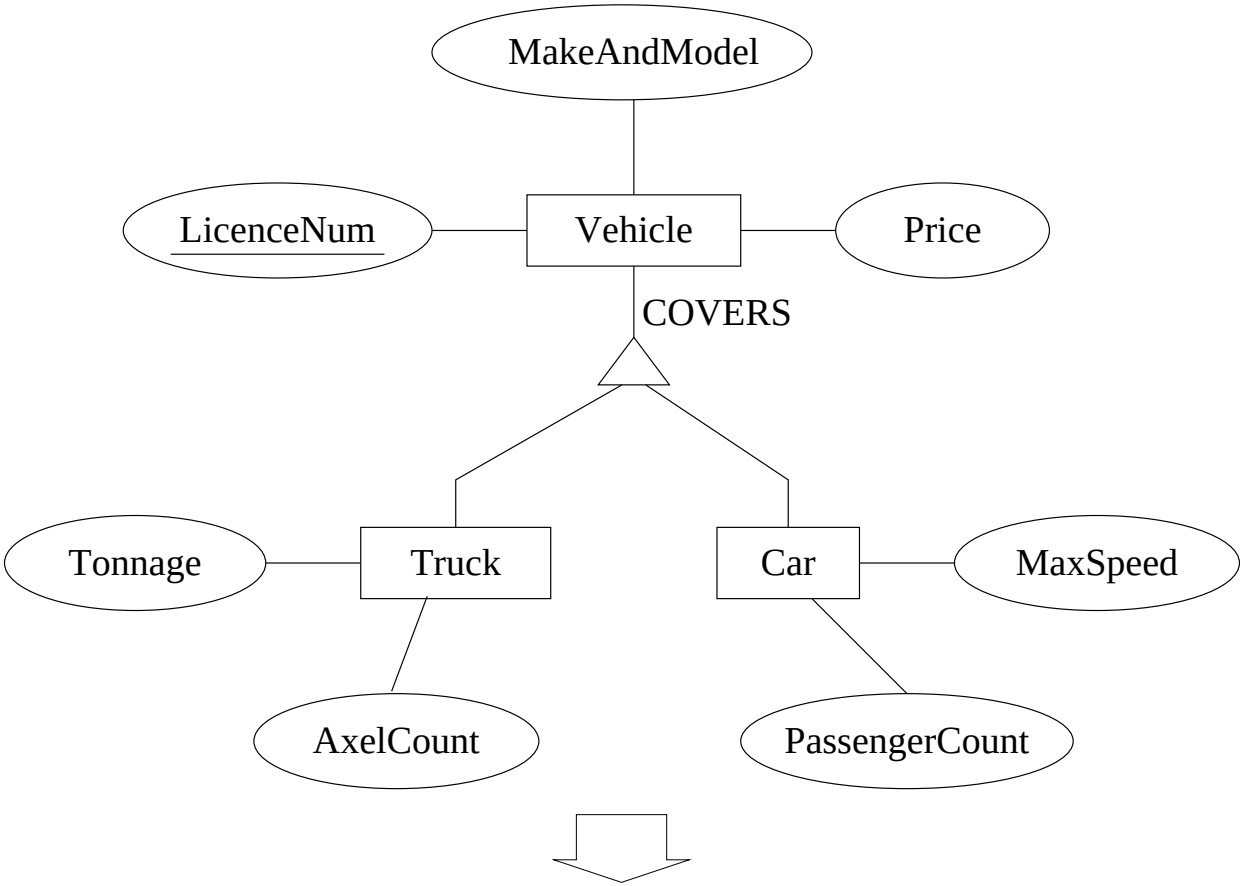
Columns of new tables should include

- Attributes of lower level entity set
- Attributes of the superset

The higher-level entity set can be defined as a view on the tables for the lower-level entity sets

Representing Generalization (Approach #1)

Example:



Truck

LicenceNum	MakeAndModel	Price	Tonnage	AxelCount

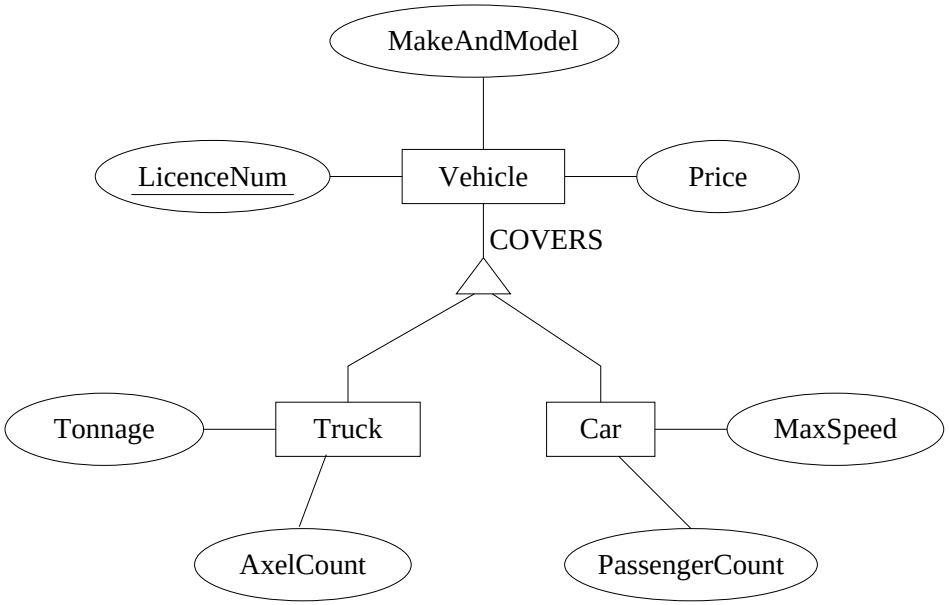
Car

LicenceNum	MakeAndModel	Price	MaxSpeed	PassengerCount

Representing Generalization (Approach #2)

Treat generalization the same as specialization.

Example:



Vehicle

LicenceNum	MakeAndModel	Price

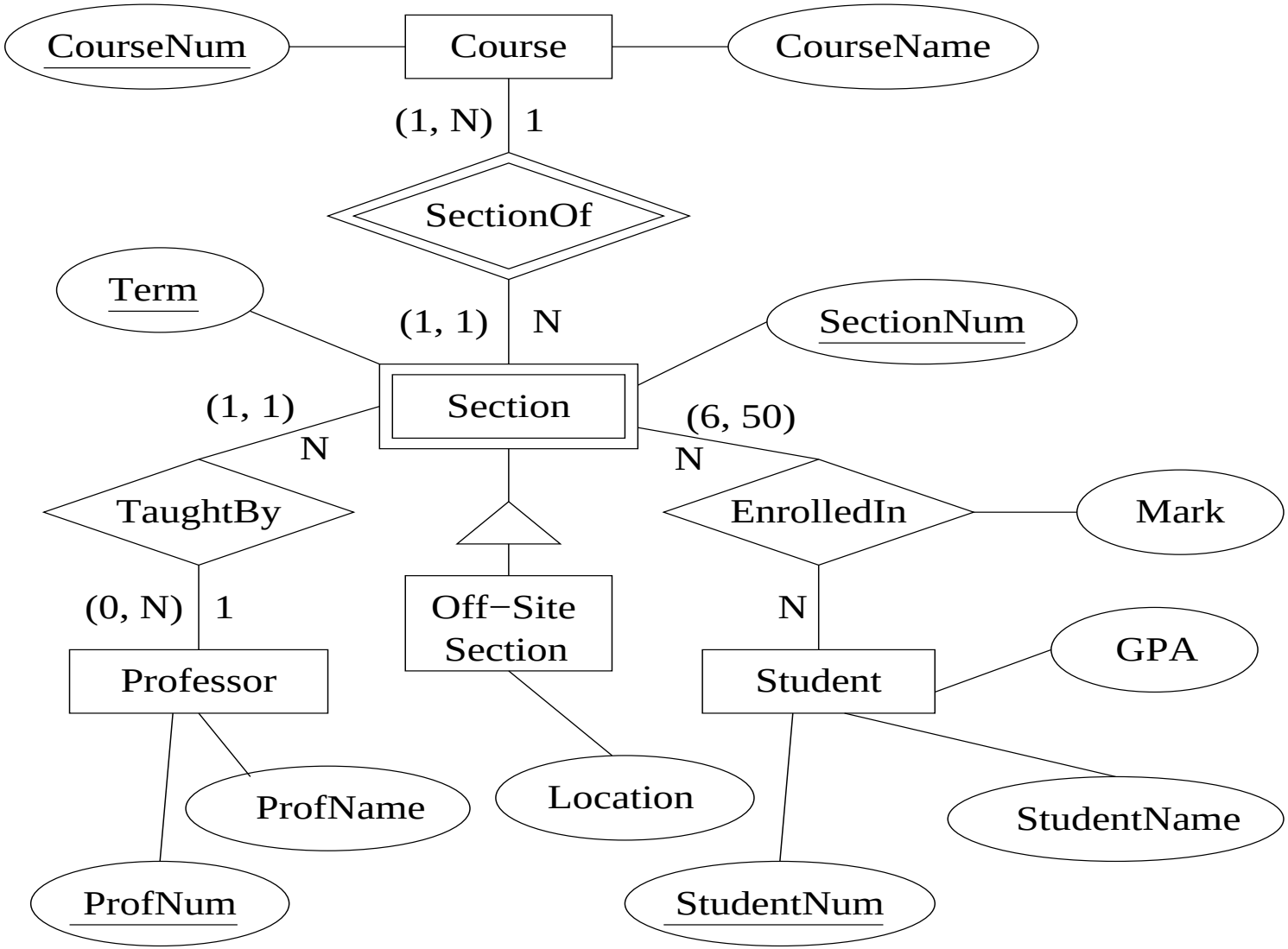
Truck

LicenceNum	Tonnage	AxelCount

Car

LicenceNum	MaxSpeed	PassengerCount

Example Translation: ER Diagram



Example Translation: Relational Diagram