

Translating Entity-Relationship to Relational Tables

Grant Weddell

Cheriton School of Computer Science
University of Waterloo

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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

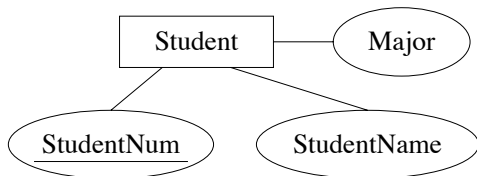
Representing Strong Entity Sets

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

Entity of type $E \leftrightarrow$ row in table E

Primary key of entity set \rightarrow primary key of table

Example:



Student

| | | |
|-------------------|-------------|-------|
| <u>StudentNum</u> | StudentName | Major |
|-------------------|-------------|-------|

Representing Weak Entity Sets

Weak entity set E translates to table E

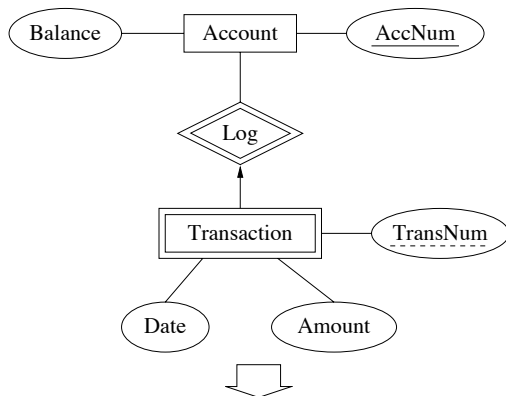
Columns of table E should include

- 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

| | |
|---------------|---------|
| <u>AccNum</u> | Balance |
|---------------|---------|

Transaction

| | | | |
|-----------------|---------------|------|--------|
| <u>TransNum</u> | <u>AccNum</u> | Date | Amount |
|-----------------|---------------|------|--------|

Representing Relationship Sets

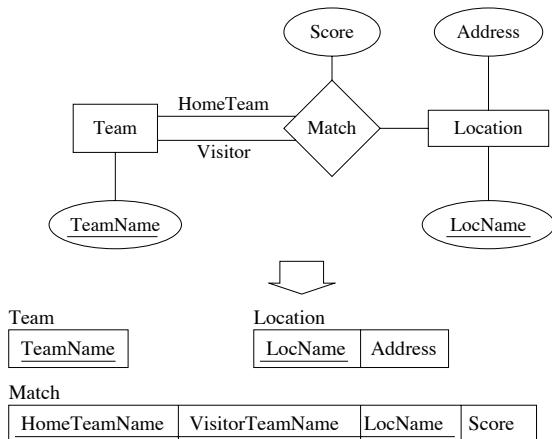
- If the relationship set is an identifying relationship set for a weak entity set then no action needed
- If we can deduce the general cardinality constraint (1,1) for a component entity set E then add following columns to table E
 - Attributes of the relationship set
 - Primary key attributes of remaining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



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

Representing Aggregation

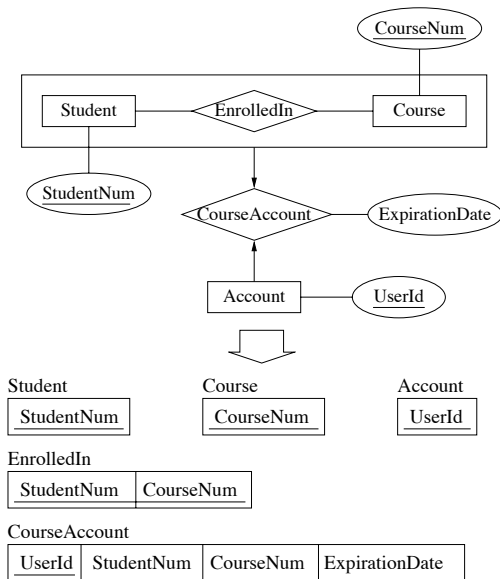
Tabular representation of aggregation of R

= 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.)

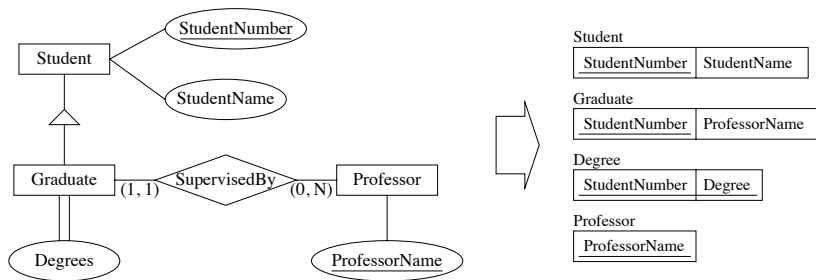
Example:



Representing Specialization

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

Example:



Representing Generalization (Approach #1)

Create a table for each lower-level entity set only

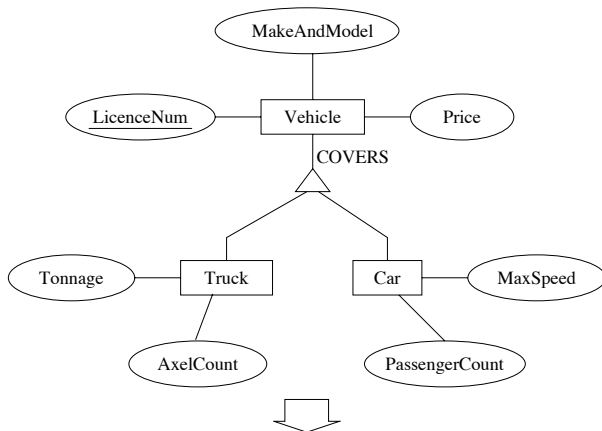
Columns of new tables should include

- 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

| | | | | |
|-------------------|--------------|-------|---------|-----------|
| <u>LicenceNum</u> | MakeAndModel | Price | Tonnage | AxelCount |
|-------------------|--------------|-------|---------|-----------|

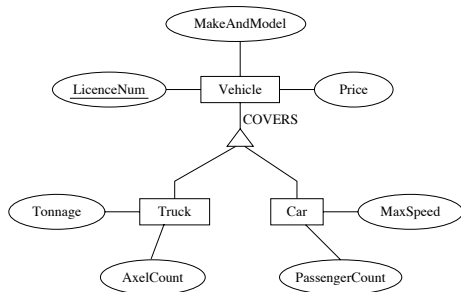
Car

| | | | | |
|-------------------|--------------|-------|----------|----------------|
| <u>LicenceNum</u> | MakeAndModel | Price | MaxSpeed | PassengerCount |
|-------------------|--------------|-------|----------|----------------|

Representing Generalization (Approach #2)

Treat generalization the same as specialization.

Example:



Vehicle

| | | |
|-------------------|--------------|-------|
| <u>LicenceNum</u> | MakeAndModel | Price |
|-------------------|--------------|-------|

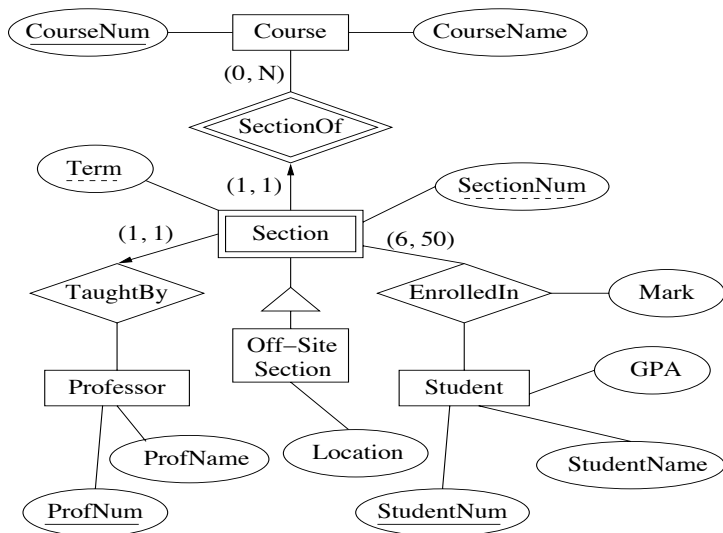
Truck

| | | |
|-------------------|---------|-----------|
| <u>LicenceNum</u> | Tonnage | AxelCount |
|-------------------|---------|-----------|

Car

| | | |
|-------------------|----------|----------------|
| <u>LicenceNum</u> | MaxSpeed | PassengerCount |
|-------------------|----------|----------------|

Example Translation: ER Diagram



Example Translation: Relational Diagram

