Mapping ER to Database Schema

Figure 9.2
Result of mapping the COMPANY ER schema into a relational database schema.
Review of Relational Schemas

- A relational schema \( R = R(A_1, \ldots A_n) \)

- For this class, specify domain in schema

  \[
  \text{Student}(:Name: string, \\
  \quad \text{SSN: string,} \\
  \quad \text{HomePhone: string,} \\
  \quad \text{Address: string,} \\
  \quad \text{OfficePhone: string,} \\
  \quad \text{Bdate: date,} \\
  \quad \text{GPA: real})
  \]

Mapping ER to Database Schema

- Fundamental building blocks in ER-diagrams:
  - Entities
    - Strong
    - Weak
  - Attributes
    - Simple
    - Composite
    - Multi-valued
  - Relationships
    - Cardinality
    - Participation

Mapping ER to Database Schema

- Fundamental building blocks in relational databases:
  - Tables
  - Attributes
    - Primary keys
    - Secondary keys
    - Foreign keys
    - Non-key attributes
  - Data types
    -
Mapping ER to Database Schema

- Map entities and relationships from ER to tables in database schema
- Map attributes from ER to attributes in database schema

Mapping ER to Database Schema

- Mapping of entities
  - Regular
  - Weak
- Mapping of relationships
  - 1:1
  - 1:N
  - M:N
- Mapping of multivalued attributes
- Mapping of N-ary Relationship Types

Mapping of Regular Entities

- Create a table for each regular entity
- Use only simple attribute or the simple component of a composite attribute
- Determine a primary key
- If multiple keys, determine secondary keys
  - Can be useful for indexing
Mapping of Weak Entities

- Create a table for each weak entity
- Use only simple attribute or the simple component of a composite attribute
- Include a foreign key attribute to owner entity
- Determine a primary key
  - Partial key plus foreign key to owner entity
- If the owner is also a weak entity, then append its owner’s primary key
Mapping of M:N Relationship

- Create a table
- Include foreign key to the participating entities
  - These foreign keys form the primary key of the relationship
Mapping of 1:N Relationship

- Method 1:
  - Treat as M:N (is this a good way?)
- Method 2:
  - Make a foreign key for the entity on the N-side to point to the primary key of the entity on the 1-side.
Mapping of 1:1 Relationship

- **Method 1:**
  - Treat as M:N (is this a good way?)
- **Method 2:**
  - Treat as 1:N (is this a good way?)
- **Method 3:**
  - Make a foreign key in one entity to the primary key of another entity (is this a good way?)
  - Put all attributes of the relationship to the table describing the entity with the foreign key
Mapping of Multivalued Attribute

- Create a table for each such attribute
  - Make a foreign key to the entity which this attribute belongs
  - Combine the foreign key and the attribute itself as the primary key of the table
Mapping of N-ary Attribute

- Like binary relationship
  - Create a table
  - Make foreign key attributes to each of the participating entity
  - Combine these foreign keys to form the primary key
Discussion and Summary of Mapping for ER Model Constructs

<table>
<thead>
<tr>
<th>ERMODEL</th>
<th>RELATIONAL MODEL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entity type</td>
<td>Entity relation</td>
</tr>
<tr>
<td>1:N or 1/N relationship type</td>
<td>Foreign key (or relationship relation)</td>
</tr>
<tr>
<td>1:N relationship type</td>
<td>Relationship relation and two foreign keys</td>
</tr>
<tr>
<td>m:n relationship type</td>
<td>Relationship relation and n foreign keys</td>
</tr>
<tr>
<td>Simple attribute</td>
<td>Attribute</td>
</tr>
<tr>
<td>Composite attribute</td>
<td>Set of simple component attributes</td>
</tr>
<tr>
<td>Multivalued attribute</td>
<td>Relation and Foreign key</td>
</tr>
<tr>
<td>Value set</td>
<td>Domain</td>
</tr>
<tr>
<td>Key attribute</td>
<td>Primary (or secondary) key</td>
</tr>
</tbody>
</table>