Translating an E-R Model to a 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 $a_1, \ldots, a_n \rightarrow$ 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
Representing Weak Entity Sets

- Weak entity set $E \rightarrow$ table $E$
- Columns of table $E$ should include
  - Attributes of the weak entity set
  - Attributes of the identifying relationship set
  - Primary key attributes of dominating entity set (as foreign key into dominating entity set)
- Primary key of weak entity set $\rightarrow$ primary key of table
Representing Weak Entity Sets (cont’d)
Representing Relationship Sets

- If the relationship set is an identifying relationship set for a weak entity set then no action needed
- If the general cardinality constraint (1,1) can be deduced 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 (as foreign keys into those entity sets)
- Otherwise: relationship set $R \rightarrow$ table $R$
Representing Relationship Sets (cont’d)

- Columns of table $R$ should include
  - Attributes of the relationship set
  - Primary key attributes of each component entity set (as foreign keys into component entity sets)

- Primary key of table $R$ determined as follows
  - If the general cardinality constraint (0,1) can be deduced for a component entity set $E$, then choose the primary key attributes for $E$
  - Otherwise, choose primary key attributes of each component entity
Representing Relationship Sets (cont’d)
Representing Aggregation

- Tabular representation for aggregation of relationship set \( R \) = tabular representation for relationship set \( R \)

- To represent relationship set involving aggregation of \( R \), treat the aggregation like an entity set whose primary key = primary key of the table for \( R \)

\[
\begin{array}{c}
\text{StudentNum} \\
\text{CourseNum} \\
\text{CourseAccount} \\
\text{ExpirationDate} \\
\text{Account} \\
\text{UserId} \\
\text{EnrolledIn} \\
\hline
\text{StudentNum} & \text{CourseNum} \\
\text{StudentNum} & \text{CourseNum} \\
\text{UserId} & \text{StudentNum} & \text{CourseNum} & \text{ExpirationDate}
\end{array}
\]
Representing Specialization

- Create table for higher-level entity set, and treat specialized entity subsets like weak entity sets
Example Translation

Course
- CourseNum
- CourseName

Student
- StudentNum
- StudentName
- GPA

Section
- CourseNum
- SectionNum
- Term
- ProfNum

EnrolledIn
- CourseNum
- SectionNum
- StudentNum
- Term
- Mark

Off-Site Section
- CourseNum
- SectionNum
- Term
- Location

Professor
- ProfNum
- ProfName