Representing Multi-Valued Attributes as Tables

- For a multi-valued attribute *M*, create a table *T* that has a column for the multi-valued attribute and, additionally, columns for the primary key of the entity or relationship set of which *M* is an attribute.

Entity Set:

employee (e-social-security, employee-name, telephone-number, dependent-name)

Tables:

employee (e-social-security, employee-name, telephone-number)

dependent-name (dname, e-social-security)

Representing One-To-Many Relationship Sets as Tables

- A many-to-one relationship set from *E1* to *E2* can be represented as a table just like a many-to-many relationship. Technically this is not necessary, and in some cases it is not appropriate.

  Entity Sets:
  account (account-number, balance)
  branch (branch-name, branch-city, assets)

  Relationship Set (total and many-to-one from *account* to *branch*):
  account-branch (account-number, branch-name)

- The above could be converted to tables directly, or as follows:

  account (account-number, balance, branch-name)
  branch (branch-name, branch-city, assets)

- Since the above relationship is *total*, a distinct table for the relationship is probably not necessary.

Process Issues

The book defines the following engineering process steps (page 49):

- Specification of user requirements
- Conceptual-design
- Specification of functional requirements
- Logical-design
- Physical-design

*Note that the development/design steps, i.e., the *process*, is typically company specific.

How these Terms Relate

- If there is a relationship set between entity sets *E1* and *E2*, and if the involvement of one of these entities, say *E1*, is total, then *E1* may be, but is not necessarily existence dependent on *E2* (Counter example: students and advisors).
- If one entity set *E1* is existence dependent on another entity set *E2*, then there will be a relationship set between *E1* and *E2* in which the involvement of *E1* is total.
- An entity set *E1* may be involved, in a total way, in a relationship with some other entity set *E2*, but that does not necessarily mean that *E1* is weak (Counter example: students and advisors).
- If an entity set is weak then, in order to be meaningful, it will always participate, in a total way, with another entity set in a one-to-many relationship.
- If an entity set *E1* is weak, does that mean it is also existence dependent on some other entity set *E2*?
- If an entity set *E1* is existence dependent on some other entity set *E2*, does that mean that it is also weak?

Definitions from the Book:

- An entity set that has a primary key is termed a *strong* entity set.
- An entity set that has no primary key is termed a *weak* entity set.
- An entity *x* is said to be *existence dependent* on an entity *y*, if *x* cannot exist without *y*, i.e., if *y* is deleted, then so is *x*.
- The participation of an entity set *E* in a relationship set *R* is said to be *total* if every entity in *E* participates in at least one relationship in *R*. Otherwise, the relationship is said to be *partial*.

  Question: What is the difference between these three concepts (strong/week, existence dependence, and totality), or are they the same?