**IS 441 Week 4 Class Summary and Highlights**

Dr. Yue Zhang

FID

SID

SLN

Mjr

FLN

Rank

FID

STUD

FAC

|  |  |
| --- | --- |
| Class outline:   1. Review HW 1; | 1. Converting ERD to relational model (Chap 4) 2. Exercise on conversion of ERD to relational model |

Review HW 1:

1. Reinforce the differences among the following concepts:
   * 1. ENTITY

Added FA 17: “Location” of cardinality notations – “Each instance of A is associated with M instances of B,” then the crow’s foot is @ the B-side

* + 1. Attribute
    2. *Value* of attribute

Example: “500 ml” is the *value* of the attribute “Volume” for the entity “BOTTLED\_WATER”; it can never be an attribute (can never be a column name).

Example: “Democratic” or “Republican” are the *value* of the attribute “Party\_Name” for the entity “POLITICAL\_PARTY”; it can never be an attribute (not a column name). [Specifically in the related HW 1 problem: the above (“Democratic” or “Republican”) were not even relevant since the ENTITY in question was “MEETING”, NOT “PARTY” (meeting within a party – so the party name is NOT used at all).

IMPORTANT reminder of a powerful, practical test/confirmation:

“When in doubt, construct a table (with rows).” It would help you to clarify your concepts about an entity, attribute, and values of attributes.

1. Relationships among entities: ONLY those entities that interact with each other will have lines of relationships among them. In other words, if two entities do not interact each other (or are not explicitly stated so in the problem), do not try to draw a relationship line between the two.
2. Location of cardinality symbols: at the FAR end of the relationship line, from the STARTING entity.

Example: “Each DRIVER (“starting” entity) may receive one or more CITATIONs (ending entity)”. This is an optional many, and the cardinality symbol (“crow’s foot” with an optional circle) should be placed at the FAR end of the relationship line from the starting entity DRIVER, i.e., **near the ending entity** CITATION.

[“Relationship starts left, cardinality on right; relationship starts from right, cardinality on left”]

1. “Rules of rules” – basics of business rules:

Prompted by stud mistakes

* + 1. Each business rule relate TWO and ONLY TWO entities (cannot have three entities in one rule);
    2. Each relationship must be described by two rules, one in each direction;
    3. All business rules begin with “Each”/ “A” / “An”.

Lecture on Chapter 4:

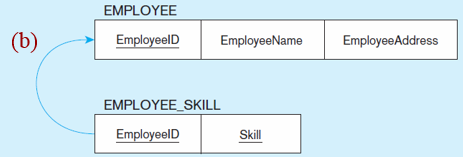
1. Easy solution to “fix” a table that is not a relation (not in 1st normal form) due to multi-value for some rows: Simply repeat the value of the “basic columns” (such as ID, name, etc) of those rows involving multivalues, for as many times as there are multivalues, so that –
   * Every row (record; entity instance) contains ONLY ONE value for each column.
2. Referential Integrity:
3. Referential integrity can be implemented as the PK-FK correspondence between the two tables: the table on the “1-side” (“parent-side”) and the table on the “M-side” (“Child-side”).
   1. If in the “Child table” (table on M-side) there is a row whose FK references a PK value in the “Parent table” (table on 1-side), that row in the parent table cannot be deleted. – “If there’s(re) child(ren) relying on a specific parent, that parent must not be removed.”
   2. If there is NOT a specific PK value in the Parent table (table on 1-side), there should NOT be rows in the Child table (table on M-side) referencing that PK value. – “If there’s not a parent, no child may be brought in claiming to be the child of that specific parent.”
4. Referential integrity arrows:
   * ALWAYS from foreign key to primary key; ALWAYS from M-side to 1-side.
   * Because associative entities are ALWAYS on the M-side, thus:
     + Referential integrity arrows always depart from the intersection relation (that is the conversion of associative entity in ERD),
     + toward the entities the associative entity connects (“You connect the two entities, so the arrows depart from you and end at them”)
5. Recursive foreign key: exists ONLY when there is an unary 1-M, where some rows (on M-side, such as subordinate employees) refer to some other rows (on 1-side, such as supervisors) using a field as foreign key which is in the same format of the primary key of the table, but referring to the primary key value of OTHER rows (say supervisors) in the same table (say EMPLOYEE).



Here ManagerID is the same format as EmployeeID, only that the MgrID of certain employees are the EmpID of THEIR managers

* + **“When in doubt, construct a table”:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| EmpID | LName | Position | ManagerID | FK 🡪 PK |
| E001 | Adams | Lead Accountant |  |  |
| E002 | Brown | Lead Engineer |  |  |
| E013 | Chen | Accountant I | E001 | E013’s Mgr is E001 |
| E015 | Davis | Accountant II | E001 | E015’s Mgr is E001 |
| E024 | Edwards | Engineer I | E002 | E024’s Mgr is E002 |
| E027 | Gonzalez | Technician II | E002 | E027’s Mgr is E002 |

1. Conversion of multi-valued attributes: Slides 4-27 and 4-30/31.
   * 
   * **“When in doubt, construct a table”:**

|  |  |  |  |
| --- | --- | --- | --- |
| EmpID | Skill | AcquiDate | Certification |
| EIT01 | IT\_Governance | 8/31/16 | CISA |
| EIT01 | Networking | 1/31/16 | Cisco |

Note the same employee possesses multiple skills.