1.4. ER diagrams

In this lecture we look at...

1.4.01. ER Diagrams and Relational mapping

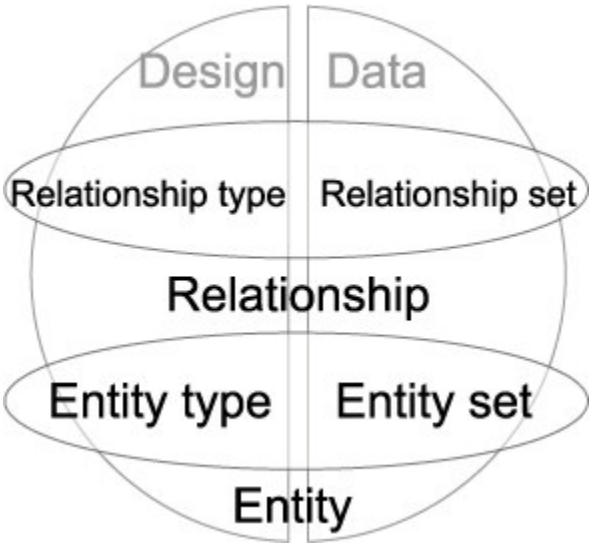
- Design communication techniques
  - ER diagrams
  - ER to relational mapping
- Entities to Objects
- Type Inheritance
  - EER diagrams
  - UML
- Web DB Integration

1.4.03. Design in the modern context

- Team based development
- Documentation
  - Value of design over description
- DB sketching (left hand side)
  - Concept more important than perfection
  - Design iteration
- Mini-world as approximation
  - Categorisation to create entities
  - Verb'ing to create actions/relationships

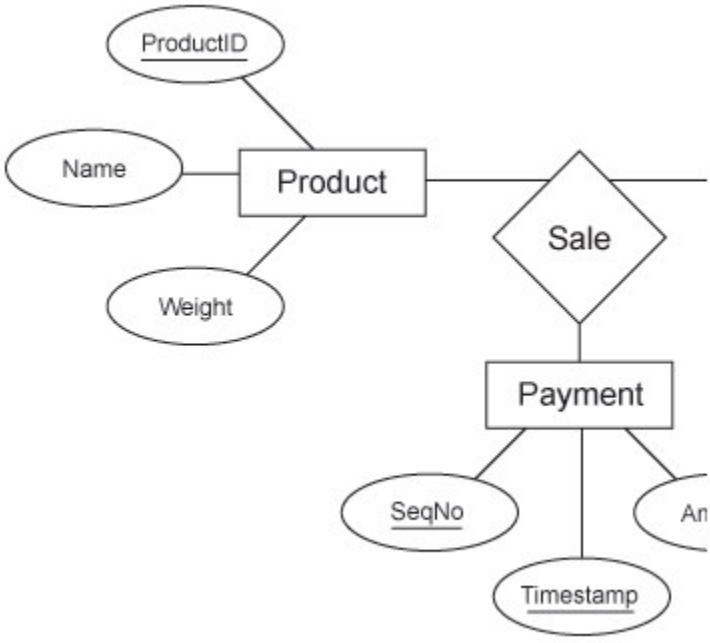
1.4.04. Database Left:right divide

- Design
  - Catalog, Meta-data, Intension, or Database schema
  - Entity type
  - Relationship type
- State
  - Set of occurences/instances, Extension, snapshot
  - Entity set
  - Relationship set



1.4.05. Basic ER diagram

- Typically part of a system
- (Strong) Entities
  - Product
  - Customer
  - Payment
- Relationships
  - Sale



1.4.06. Mapping ER to Relation DB tables

- Intuitive mapping

    - Entities as tables
    - Attributes as columns
- Relationships are more difficult
- Key sharing mechanism
    - Foreign key references primary key
- Where to put the foreign key forms the intuitive guide to the rest of the mapping

1.4.07. ER to Relational mapping

- Step-by-step approach

1. Strong entities
    - Create relation including (simplified) attributes
2. Weak entities
    - Create relation inc. attr, foreign/pri key of owner
3. Binary relationship S:T, 1:1
    - Choose relation, say S (with total participation) and inc. foreign/pri key of T
    - inc. relationship attributes

1.4.08. Cardinality

- Specifies number of relationship instances a single entity can participate in
- S:T (1:1)
- An entity from table S can is related to one, and only one entity from table T
- 1:1, 1:N, N:M
    - DEPARTMENT : EMPLOYEE
    - EMPLOYEE : EMPLOYEE
    - PROJECT : EMPLOYEE

1.4.09. ER to Relational mapping

5. Binary relationship 1:N
    - Choose relation T (N-side) inc. foreign/pri key of S
6. Binary relationship M:N
    - Create relation, inc. foreign/pri keys of S&T
7. Multivalued
    - For each mv_attr, create new relation, inc. foreign/pri key of parent
8. n-ary relationship
    - Create new relation, inc. all foreign/pri keys of participating entities

1.4.10. Participation

- Participation constraints
- Existence of an entity dependant upon
    - being related to another entity
    - via relationship type (left hand/design)
- Total (")/Existence dependency (double line)
    - Every student must be in a faculty
    - For every entity in the total set of students
- Partial ($) (single line)
    - Some students are student_representatives
    - There exists some entity(s) within the set of all…