### Introduction to Data Management CSE 344

Lecture 14: E/R Diagrams

Magda Balazinska - CSE 344, Fall 2012

### Today: E/R Diagrams

### Motivating scenario

- · Customer asks you to help them setup a DBMS
- · They want to store information about
  - Companies and various branches inside companies
    - Each company has a name, an address, and a CEO
    - Each company also has a list of key employees
    - Each branch has a name and a market share in \$\$\$
  - Products manufactured by these companies
    - Each product has a name and a description
    - · Products are manufactured by different branches

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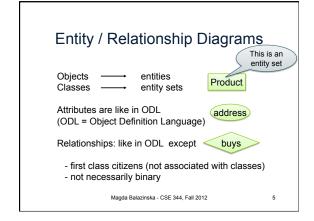
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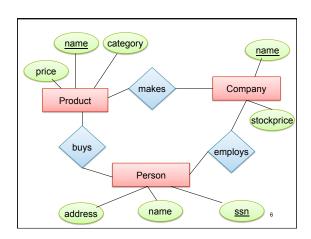
### **Database Design**

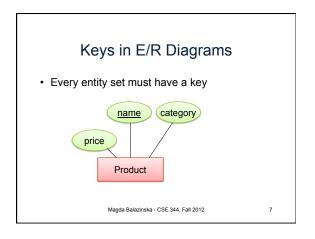
- · Why do we need it?
  - Need a way to model real world entities in terms of relations
  - Not easy to go from real-world entities to a database schema
- · Consider issues such as:
  - What entities to model
  - How entities are related
  - What constraints exist in the domain
  - How to achieve *good* designs
- Several formalisms exists
  - We discuss E/R diagrams

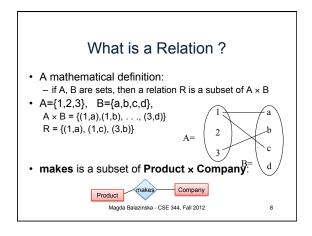
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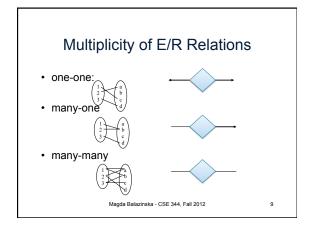
# Database Design Process Conceptual Model: Relational Model: Tables + constraints And also functional dep. Normalization: Eliminates anomalies Conceptual Schema Physical storage details Physical Schema

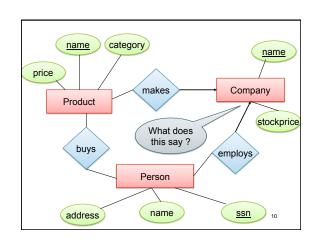


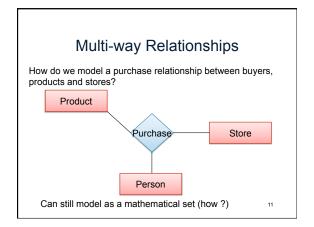


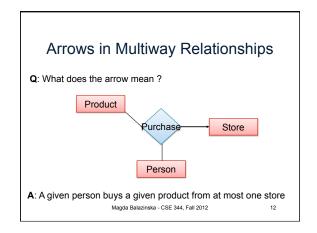


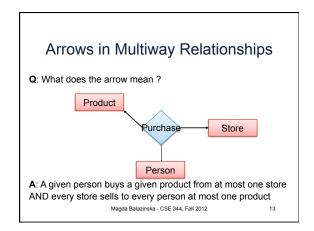


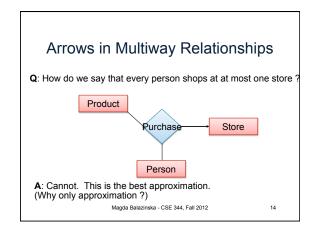


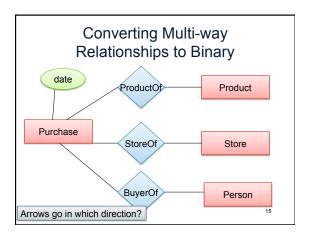


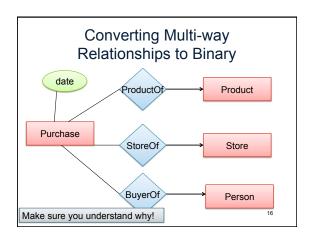


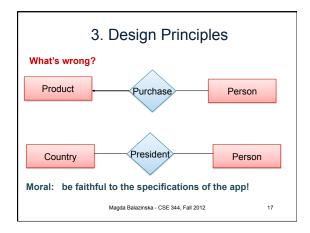


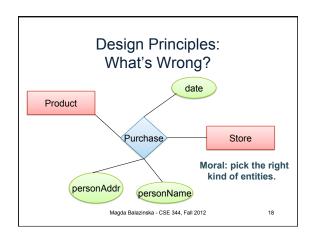


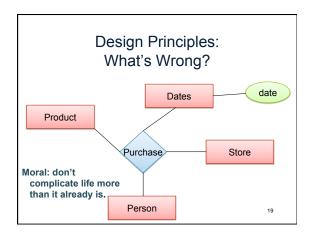




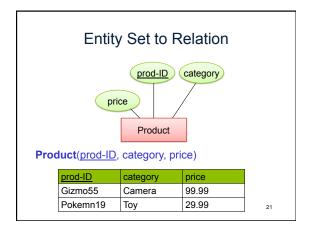


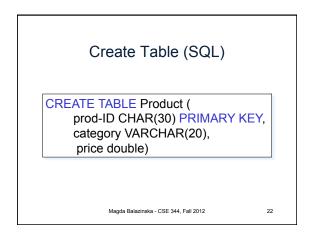


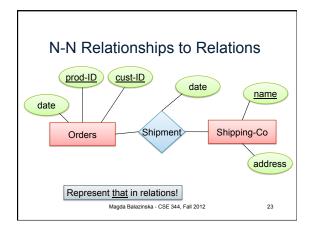


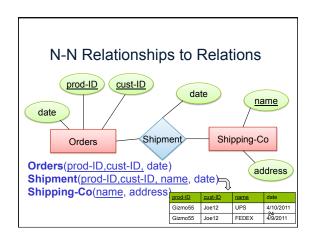


### From E/R Diagrams to Relational Schema • Entity set → relation • Relationship → relation

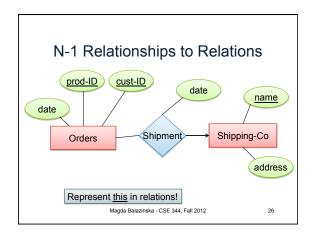


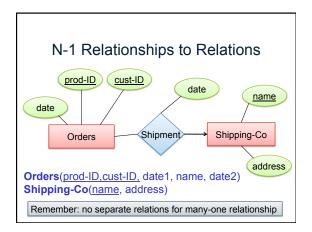


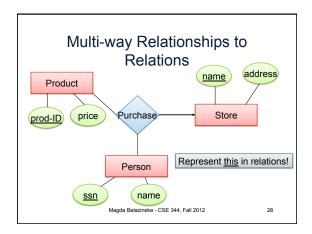


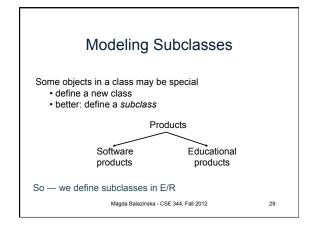


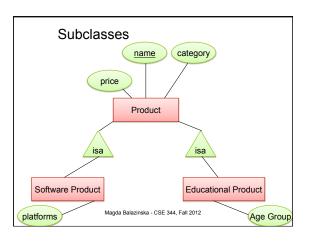
## Create Table (SQL) CREATE TABLE Shipment( name CHAR(30) REFERENCES Shipping-Co, prod-ID CHAR(30), cust-ID VARCHAR(20), date DATETIME, PRIMARY KEY (name, prod-ID, cust-ID), FOREIGN KEY (prod-ID, cust-ID) REFERENCES Orders )

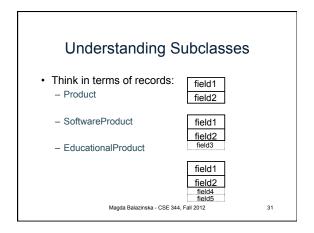


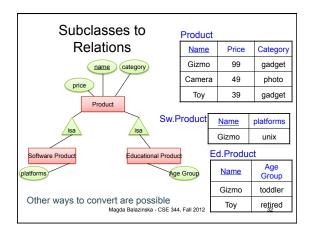


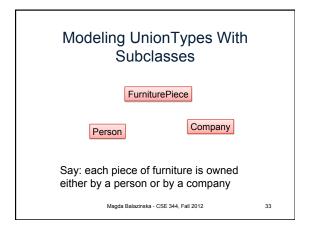


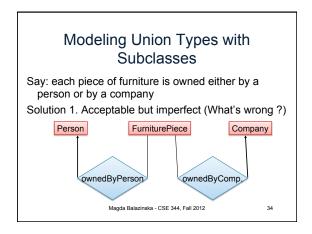


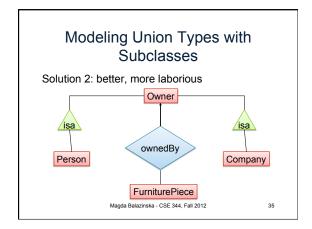


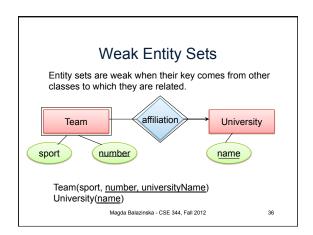


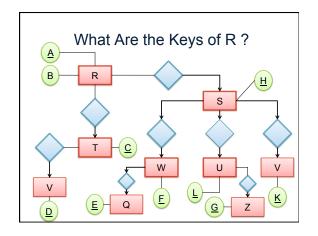












### Constraints in E/R Diagrams Finding constraints is part of the modeling process. Commonly used constraints: Keys: social security number uniquely identifies a person. Single-value constraints: a person can have only one father. Referential integrity constraints: if you work for a company, it must exist in the database. Other constraints: peoples' ages are between 0 and 150.

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