

CSCI 2141

January 14, 2013

Homework was:

- Read the SFU tutorial 3: An introduction to data modeling (<http://sfubusiness.ca//areas/mis/tutorials/2np/lessons/model.pdf>)
- Take a stab at creating an ER diagram for our bus example – we will fully work through it together on Monday)

Activity 3:

Develop the conceptual model with an Entity-Relationship Diagram (ERD)

1. What are the entities in our database (nouns – these will be the tables)
 - Draw these as squares
2. What are their attributes? (properties/characteristics of an entity that we want to collect and store in the DB) – think about what would uniquely identify a particular instance of the entity)
 - Draw these as bubbles off the square
 - Underline the attribute(s) that uniquely identifies instance
3. What are the relationships between entities? (what is the cardinality of that relationship? (1-1? 1-many? Etc.)
 - Draw lines between entities – put a label on the line in a diamond
 - Indicate by crow's feet (or #'s) the cardinality at each end of the relationship

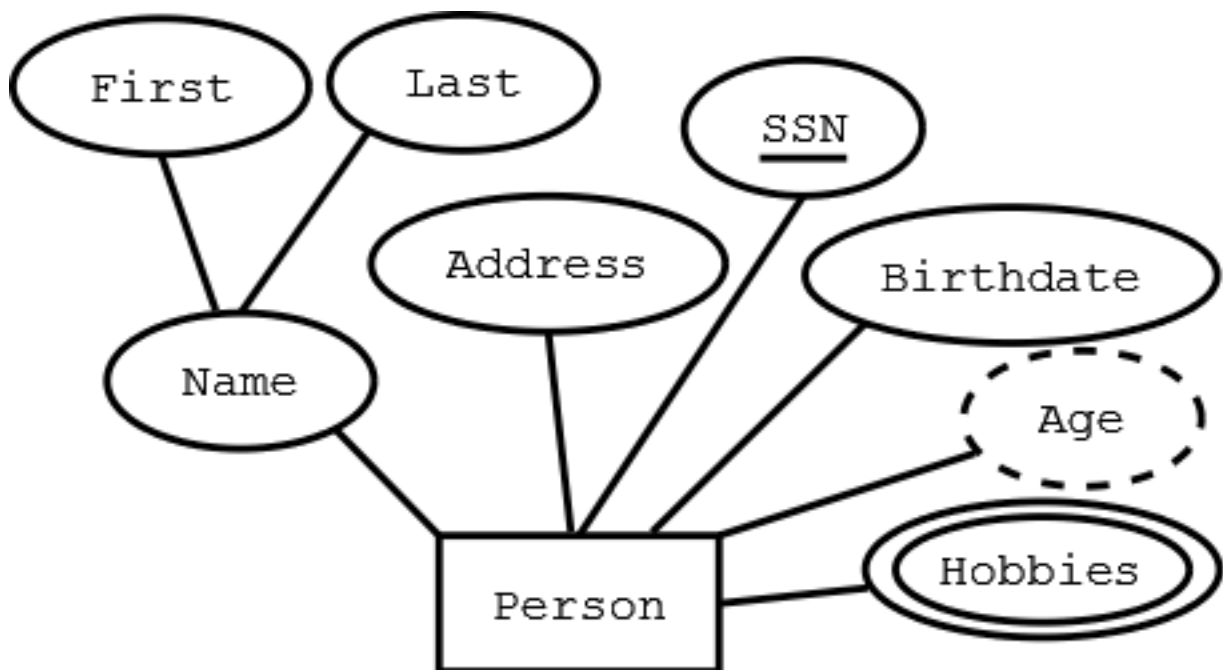
ER Diagram Basics:

Entity: Real-world object, distinguishable from other objects. An entity is described using a set of attributes.

Entity Set: A collection of similar entities (e.g., all employees). All entities in an entity set have the same set of attributes (except if hierarchies). Each entity set has a key (underlined). Each attribute has a domain (integers, alphanumeric, etc.)

Relationship: An association between 2 or more entities. Relationships can have their own attributes.

Graphical Representation in E-R diagram



Rectangle -- Entity

Ellipses -- Attribute (underlined attributes are [part of] the primary key)

Double ellipses -- multi-valued attribute

Dashed ellipses-- derived attribute, e.g. age is derivable from birthdate and current date

Keys:

- Superkey: an attribute or set of attributes that uniquely identifies an entity--there can be many of these
- Composite key: a key requiring more than one attribute
- Candidate key: a superkey such that no proper subset of its attributes is also a superkey (minimal superkey – has no unnecessary attributes)
- Primary key: the candidate key chosen to be used for identifying entities and accessing records. Unless otherwise noted "key" means "primary key"
- Alternate key: a candidate key not used for primary key
- Secondary key: attribute or set of attributes commonly used for accessing records, but not necessarily unique
- Foreign key: term used in relational databases (but not in the E-R model) for an attribute that is the primary key of another table and is used to establish a relationship with that table where it appears as an attribute also. So a foreign key value occurs in the table and again in the other table. This conflicts with the idea that a value is stored only once; the idea that a fact is stored once is not undermined.

OUR EXAMPLE

Candidate entities (potential attributes) (**note: these are not necessarily correct or the best way of thinking of things – ER diagrams can need lots of iterations!)

- Bus Rider (type or personal characteristics/preferences)
- Fares (rider class, route type)
- Route (Type, set of stops)
- Bus stop (location)
- Route timing schedule (key stop times, start time for each loop)
- Schedule type (week day, weekend, holiday)
- Bus Driver (employee #)
- Driver schedule (weekly schedule, date, route, time)

Strategy:

1. Holistic:

- Having read all the scenarios and thought about the data needed to support them, start with the basics: bus route, bus stop, bus schedule
- Keep building and linking entities with relationships
- Go back to scenarios and see if have captured all aspects of data needed

2. Scenario approach:

- a. First scenario: work out the ER diagram
- b. For rest of scenarios:
 - i. Add to ER diagram if does not support scenario

Let's start with bus routes and stops and work from there.

Bus Scheduling ER Diagram

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