CS 1555 / 2055 – Database Management Systems (Fall 2020)
Dept. of Computer Science, University of Pittsburgh

Assignment #7: Database Design – E-R

Release: Nov. 13, 2020 Due: 8:00 PM, Nov. 20, 2020.

E-R Design [100 points total]

1. [70 points] E-R Diagram
   Assumptions (excluding those already in description):
   - A user can put 0 or many products for auction.
   - A product can be sold to exactly 1 user.
   - A user may never bid any product.
   - A user may bid many products.
   - A user may bid the same product multiple times during the auction period.
   - For each bid, a bidlog is kept in BidLog.
   - BidLog is uniquely identified by bidsn (Bid serial number).
   - To put a product for auction, the number of days that the product will be in auction is provided.
   - An unpopular product may get no bids.
   - A popular product may get many bids.
   - A product belongs to at least 1 category.
   - A product may belong to several categories.
   - A category has between 0 and 10 subcategories.
   - If a category is a subcategory of another category, it can not be a subcategory of any other categories.
   - The status of a product is either "underauction", "sold" or "withdrawn".
   - A category can not be a subcategory of itself.

   Textual forms:
   - Entities
     - User: *login_name*, *email*, password, name(first_name, middle_initial, last_name), address;
     - Product: *auction_id*, name, description;
     - Category: *name*;
     - BidLog: *bidsn*, amount;
   - Relationships
     - auctions: <User, Product> 1:M, PARTIAL/TOTAL, status, start_date, number_of_days, min_price;
     - bids: <User, Product,BidLog> 1:1:M, PARTIAL/PARTIAL/TOTAL, bid_date;
     - buys: <Product, User, BidLog> 1:1:1, PARTIAL/PARTIAL/PARTIAL, sell_date;
     - belongs-to: <Product, Category> 1:M, TOTAL/PARTIAL;
     - contains: <Parent Category, Child Category> 1:M, PARTIAL/PARTIAL;

Diagrammatic forms:
Note we have used dotted lines to denote total participation instead of two solid lines.

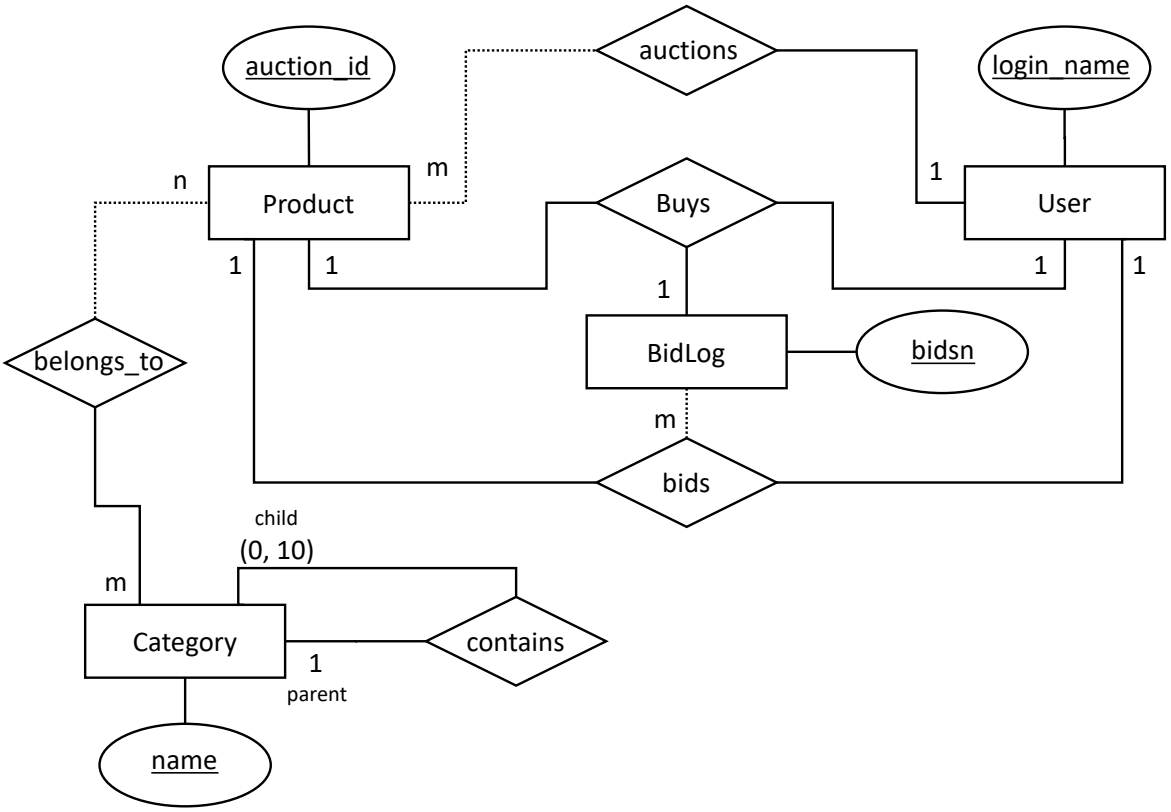

Figure 1: E-R Diagram (Entity attributes not included)

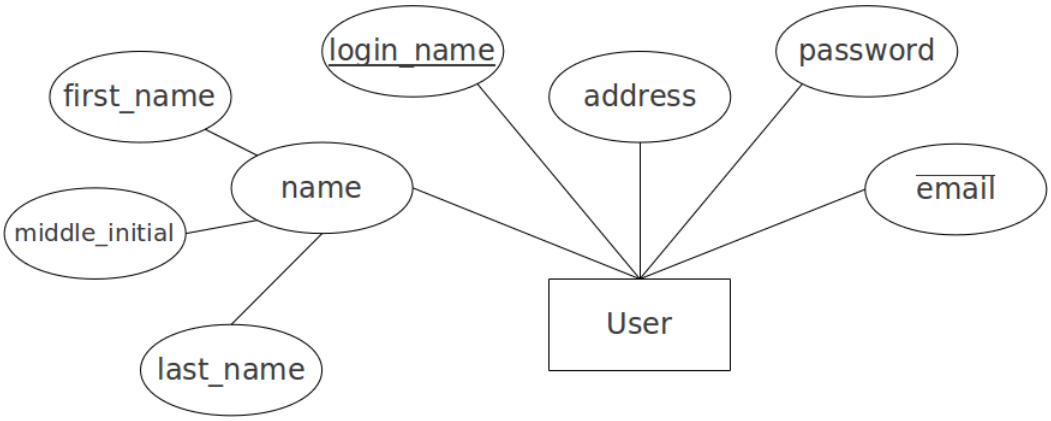

Figure 2: E-R Diagram (Entity Set User)

2. [30 points] Translating E-R Diagram into table schemas

- User(login_name, password, first_name, middle_initial, last_name, address, email)
  PK (login)
  Datatype
  - login_name varchar(10)
  - password varchar(10)
  - name varchar(20)
  - address varchar(30)
  - email varchar(20)
- Product(auction_id, name, description, seller, start_date, min_price, number_of_days, status, buyer, sell_date, amount)
  PK (auction_id)
  FK (seller) → User(login_name)
  FK (buyer) → User(login_name)
  CHECK (amount > 0)
  CHECK (min_price >= 0)
  Datatype
  - auction_id int
  - name varchar(20)
  - description varchar(30)
  - seller varchar(10)
  - start_date date
  - min_price int
  - number_of_days int
  - status varchar(15)
  - buyer varchar(10)
  - sell_date date
  - amount int
- Bidlog(bidsn, auction_id, bidder, bid_date, amount)
  PK (bidsn)
  FK (auction_id) → Product(auction_id)
  FK (bidder) → User(login_name)
  CHECK (bid_date IS NOT NULL)
  CHECK (amount > 0)
  Datatype
  - bidsn int
  - auction_id int
  - bidder varchar(10)
  - bid_date date
  - amount int
- Category(name, parent_category)
  PK (name)
  FK (parent_category) → Category(name)
  CHECK (COUNT(name, parent_category)<10)
  Datatype

  - name varchar(20)
  - parent_category varchar(20)
- BelongsTo(auction_id, category)
  PK (auction_id, category)
  FK (auction_id) → Product(auction_id)
  FK (category) → Category(name)
  Datatype
  - auction_id int
  - category varchar(20)

You will not lost points if you did not specify the data types.