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**TAPtoBUY ER Diagram Report:**

**Entity sets:**

1. **item:** Represents an item put on sale or on auction by a given seller (it is the generalization of these two). It contains the title, duration, and the shipping price given by the seller. It also tells whether the item duration time has ended or not.
2. **item\_info:** Describes the item itself (not the sale or auction). It includes item attributes such as the model, brand, dimensions, description, an image, and what product it is for example an iPhone 3g.
3. **category:** Holds all the categories available; categories, subcategories, the subcategories of these subcategories and so on.
4. **item\_for\_sale:** The specialization of an item that represents an item put on sale by a seller. It contains the item’s instant price, the starting quantity provided by the seller and the remaining quantity of them.
5. **item\_for\_auction:** The specialization of an item that represents an item that is for auction. It contains the starting bid price provided by the seller, the current bid price and amount of bids placed by users, and the rate at which bid prices increment.
6. **cart:** Every user has one cart which has an unique id and the number of items that the user has put on it.
7. **bid:** Represents a bid placed by a given user to an item in auction. This bid is related to one user and to one item for auction. It contains the amount of money that the user placed, when he/she placed the bid and if this bid is the one currently winning.
8. **user:** Represents an user account with its unique id, its username, password, first\_name, last\_name, and email address. It is related to the shipping addresses, credit cards and billing addresses of the user.
9. **credit\_card:** Represents the credit cards associated to a user and to the orders they hava bought or sold. It contains attributes such as: card number, holders name and expiration date.
10. **billing\_address**: The billing address associated to a credit card. It contains attributes such as country, contact name, street, city, state, zip code, and telephone number.
11. **shipping\_address:** The shipping address where items are going to be sent. It contains the same attributes of billing address.
12. **item\_order:** Describes an order of an item in sale that has been bought by a user. It contains the order id, the date when the order took place.
13. **auction\_order:** Describes an order of an item on auction that has been won. It contains the order id and the date when the order took place.
14. **admin:** Administrator user account which has the same attributes of a regular user but can manage categories, get report of orders and edit user accounts.

**Relationship sets:**

1. **item\_has\_info:** States that every item is related to one item\_info and that every item\_info is related to only one item.
2. **item\_from\_cat**: States that many items can be related to one category and that every item is within a category.
3. **has\_subcat:** Allows getting all the categories in the database by relating all subcategories to their parent categories.
4. **puts\_on\_sale**: states that one user can put many items on sale and every item on sale is from only one user.
5. **puts\_on\_auction:** states that one user can put many items for auction and that every item on auction is from only one user.
6. **places\_bid:** states that a user can put many bids and that every bid comes from only one user.
7. **bid\_for\_item:** states that there can be many bids placed for a single item and that every bid is for an item.
8. **ranks:** says that a buyer can rank many sellers and has the attribute of the amount of stars given by a user to another.
9. **user\_crdt\_card:** states that every user has one or more credit cards and that every credit card must belong to one user.
10. **user\_ship\_addr:** states that every user has one or more shipping addresses and that each shipping address belongs to one user.
11. **crcard\_bill\_addr:** specifies that every credit card has a billing address associated to it and that every billing address is related to one credit card.
12. **auc\_ord\_shaddr:** tells that every auction order is related to one shipping address and that one shipping address can be related to many auction orders.
13. **auc\_ord\_crcard:** tells that every auction order is related to one credit card and that one credit card can be related to many auction orders.
14. **won\_auc\_ord:** states that every auction order is for one item\_for\_auction. Also specifies the price paid for the item.
15. **itm\_ord\_shaddr**: specifies that every item order is related to one shipping address and that one shipping addess can be related to many item orders.
16. **itm\_ord\_crcard:** tells that every item order is related to one credit card and that one credit card can be related to many item orders.
17. **buyr\_bght\_ordr:** tells that every bought item order belongs to one buyer and that a buyer may have several bought item orders.
18. **sellr\_bght\_ordr:** tells that every bought item order belongs to one seller and that a seller may have several bought item orders.
19. **buyr\_auc\_ordr:** tells that every auction order belongs to one buyer and that a buyer may have several auction orders.
20. **sellr\_bght\_ordr:** tells that every auction order belongs to one seller and that a seller may have several auction orders.
21. **buy\_now\_ord:** specifies that every item order is related to one or more items for sale bought in the order and that items for sale can be related to zero or more item orders. It also tells the quantity of a given item bought in the order and the amount paid for that item.
22. **user\_cart:** tells that every user has a one cart and that every cart is related to one user.
23. **item\_in\_cart:** tells that a cart has zero or more items for sale in it and that an item for sale can be within zero or more carts.
24. **manages\_cat:** states that every admin user can manage all the categories.
25. **manages\_user:** states that every admin user can manage all the user accounts.
26. **rep\_itm\_ords:** states that every admin user can get reports of all the bought item orders.
27. **rep\_auc\_ords:** states that every admin user can get reports of all the auction orders.

**ER Mapping:**

1. item\_info(iInfo\_id bigserial primary key, product varchar(30), model varchar(45), brand varchar(40), dimensions varchar(30), description varchar(255));
2. category(cat\_id bigserial primary key, catName varchar(15));
3. item(iId bigserial primary key, iTitle varchar(255), starting\_quantity integer, remaining\_quantity integer, iStart\_sale\_date timestamp, iTime\_duration interval, iShipping\_price float, iInfo\_id bigint, cat\_id bigint, foreign key(iInfo\_id) references item\_info, foreign key(cat\_id) references category);
4. users(uId bigserial primary key, username varchar(15), pass varchar(15), fName varchar(15), lName varchar(15), email varchar(25));
5. item\_for\_sale(iId bigint primary key, instant\_price float, uId bigint, foreign key (iId) references item, foreign key (uId) references users);
6. item\_for\_auction(iId bigint primary key, starting\_bid\_price float, current\_bid\_price float, total\_bids integer, bid\_rate float, uId bigint, foreign key (iId) references item, foreign key (uId) references users);
7. has\_subcat(childCat\_id bigint primary key, parentCat\_id bigint, foreign key (childCat\_id) references category, foreign key (parentCat\_id) references category);
8. bid(bidId bigserial primary key, bid\_amount float, bid\_date timestamp, winningBid boolean, iId bigint, uId bigint, foreign key (iId) references item, foreign key (uId) references users);
9. billing\_address(billAddr\_Id bigserial primary key, country varchar(15), contact\_name varchar(25), street varchar(255), city varchar(30), state char(3), zip\_code char(5), telephone varchar(20));
10. shipping\_address(shipAddr\_Id bigserial primary key, country varchar(15), contact\_name varchar(25), street varchar(255), city varchar(30), state char(3), zip\_code char(5), telephone varchar(20),uId bigint, foreign key(uId) references users);
11. credit\_card(crCard\_Id bigserial primary key, sec\_number char(16), holders\_name varchar(20), exp\_date char(5), billAddr\_Id bigint, uId bigint, foreign key(billAddr\_Id) references billing\_address, foreign key(uId) references users);
12. user\_cart\_item(uId bigint, iId bigint, primary key (uId, iId), foreign key (uId) references users, foreign key (iId) references item);
13. ranks(buyer\_uId bigint, seller\_uId bigint, num\_of\_stars integer, primary key(buyer\_uId, seller\_uId), foreign key (buyer\_uId) references users, foreign key (seller\_uId) references users);
14. buyNow\_order(buyNow\_order\_id bigserial primary key, buyNow\_order\_date timestamp, buyer\_uId bigint,shipAddr\_Id bigint, crCard\_Id bigint,foreign key(buyer\_uId) references users,foreign key(shipAddr\_Id) references shipping\_address, foreign key(crCard\_Id) references credit\_card);
15. buyNow\_order\_items(buyNow\_order\_id bigint,iId bigint, paid\_price float,paid\_shipping\_price float, quantity integer, primary key(buyNow\_order\_id, iId), foreign key(buyNow\_order\_id) references buyNow\_order, foreign key(iId) references item)
16. admins(aId bigserial primary key, username varchar(15), pass varchar(15), fName varchar(15), lName varchar(15), email varchar(25));
17. seller\_buynow\_order(seller\_id bigint, buynow\_order\_id bigint, payId bigint, primary key (seller\_id,buynow\_order\_id),foreign key (seller\_id) references users, foreign key (buynow\_order\_id) references buynow\_order, foreign key(payId) references paypal);
18. paypal(payId bigserial primary key,pay\_email varchar(25),seller\_uId bigint,foreign key(seller\_uId) references users);
19. auction\_order(auc\_order\_id bigserial primary key, auc\_order\_date date, buyer\_uId bigint, seller\_uId bigint,shipAddr\_Id bigint, crCard\_Id bigint, iId bigint, item\_finalprice float, shipping\_price float, payId bigint, foreign key(buyer\_uId) references users, foreign key(seller\_uId) references users, foreign key(shipAddr\_Id) references shipping\_address, foreign key(crCard\_Id) references credit\_card, foreign key(iId) references item, foreign key(payId) references paypal);