1. Indicate the changes (using the shorthand representation) that you would need to make to the original TAL Distributors database design (see Figure 2-1) to support the following requirements. A customer is not necessarily represented by a single sales rep, but can be represented by several sales reps. When a customer places an order, the sales rep who gets the commission on the order must be in the collection of sales reps who represent the customer.

REP (<u>REP_NUM</u>, LAST_NAME, FIRST_NAME, STREET, CITY, STATE, POSTAL_CODE, COMMISSION, RATE)

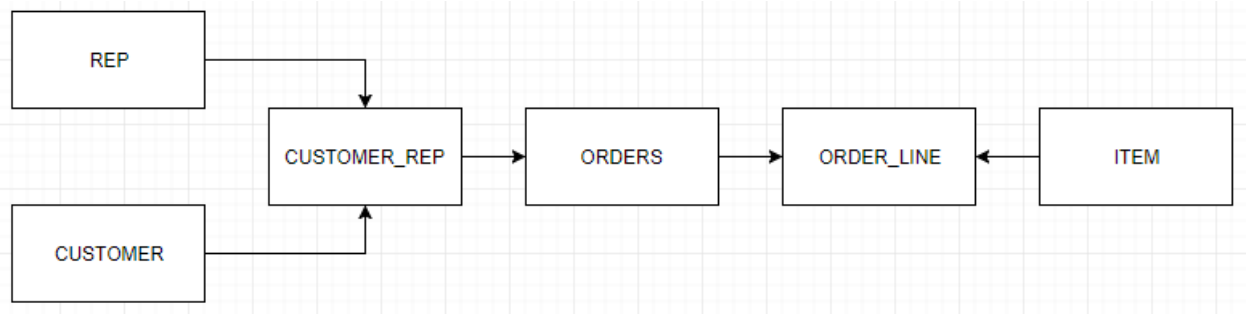
CUSTOMER (<u>CUSTOMER_NUM</u>, CUSTOMER_NAME, STREET, CITY, STATE, POSTAL_CODE, BALANCE, CREDIT_LIMIT)

CUSTOMER_REP (<u>CUSTOMER_NUM</u>, <u>REP_NUM</u>)

ORDERS (<u>ORDER_NUM</u>, ORDER_DATE, CUSTOMER_NUM, REP_NUM)

ORDER_LINE (<u>ORDER_NUM</u>, <u>ITEM_NUM</u>, NUM_ORDERED, QUOTED_PRICE)

ITEM (<u>ITEM_NUM</u>, DESCRIPTION, ON_HAND, CATEGORY, STOREHOUSE, PRICE)



2. Indicate the changes (using the shorthand representation) that you would need to make to the original TAL Distributors database design to support the following requirements. There is no relationship between customers and sales reps. When a customer places an order, any sales rep can process the order. On the order, you need to identify both the customer placing the order and the sales rep responsible for the order. Draw an E-R diagram for the new design.

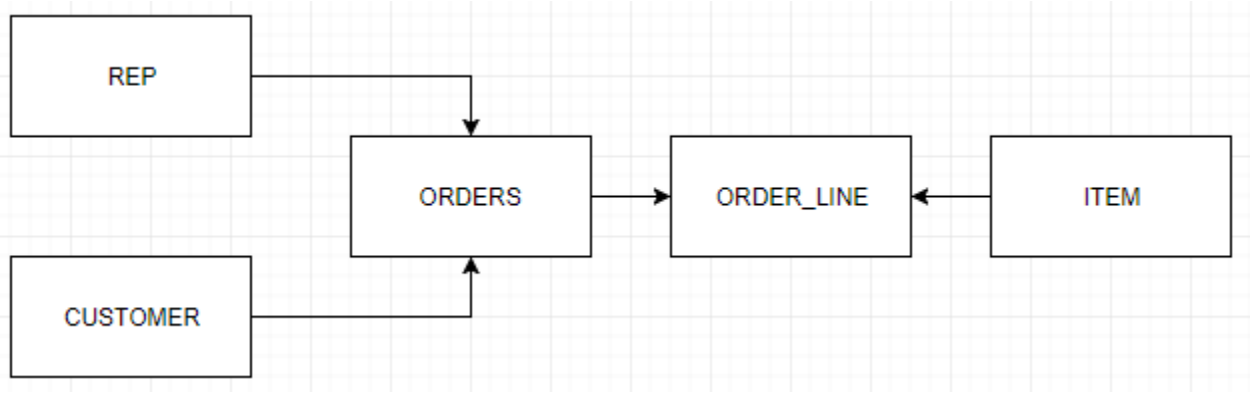
REP (REP_NUM, LAST_NAME, FIRST_NAME, STREET, CITY, STATE, POSTAL_CODE, COMMISSION, RATE)

CUSTOMER (CUSTOMER_NUM, CUSTOMER_NAME, STREET, CITY, STATE, POSTAL_CODE, BALANCE, CREDIT_LIMIT)

ORDERS (ORDER_NUM, ORDER_DATE, CUSTOMER_NUM, REP_NUM)

ORDER_LINE (ORDER_NUM, ITEM_NUM, NUM_ORDERED, QUOTED_PRICE)

ITEM (ITEM_NUM, DESCRIPTION, ON_HAND, CATEGORY, STOREHOUSE, PRICE)



3. Indicate the changes (using the shorthand representation) that you would need to make to the original TAL Distributors database design in the event that the original Requirement 3 is changed as follows. For an item, store the item's number, description, category, and price. In addition, for each storehouse in which the item is located, store the number of the storehouse, the description of the storehouse, and the number of units of the item stored in the storehouse. Draw an E-R diagram for the new design.

REP (<u>REP_NUM</u>, LAST_NAME, FIRST_NAME, STREET, CITY, STATE, POSTAL_CODE, COMMISSION, RATE)

CUSTOMER (<u>CUSTOMER_NUM</u>, CUSTOMER_NAME, STREET, CITY, STATE, POSTAL_CODE, BALANCE, CREDIT_LIMIT, REP_NUM)

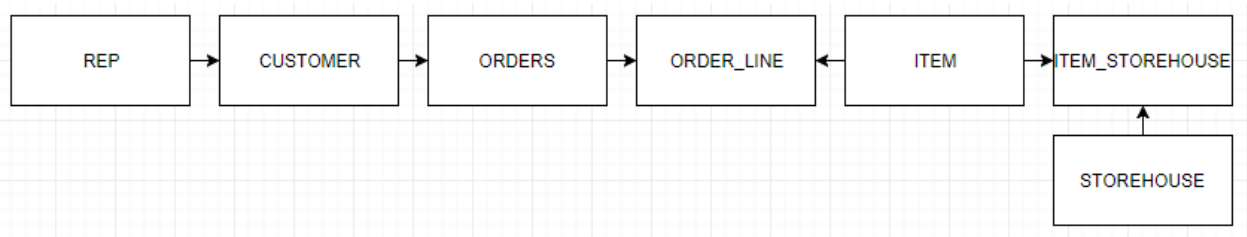
ORDERS (<u>ORDER_NUM</u>, ORDER_DATE, CUSTOMER_NUM)

ORDER_LINE (<u>ORDER_NUM</u>, <u>ITEM_NUM</u>, NUM_ORDERED, QUOTED_PRICE)

ITEM (<u>ITEM_NUM</u>, DESCRIPTION, CATEGORY, PRICE)

STOREHOUSE (<u>STOREHOUSE_NUM</u>, STOREHOUSE_DESCRIPTION)

ITEM_STOREHOUSE (<u>ITEM_NUM</u>, <u>STOREHOUSE_NUM</u>, ON_HAND)

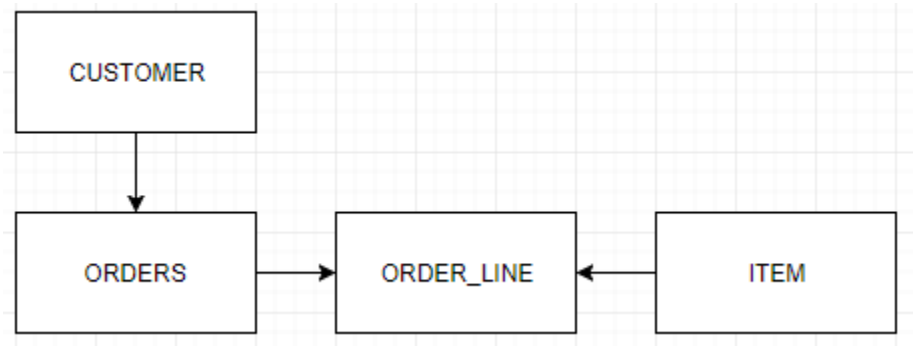


4. Using your knowledge of TAL Distributors, determine the functional dependencies that exist in the following table. After determining the functional dependencies, convert this table to an equivalent collection of tables that are in third normal form.

ITEM (ITEM_NUM, DESCRIPTION, ON_HAND, CATEGORY, STOREHOUSE, PRICE, (ORDER_NUM, ORDER_DATE, CUSTOMER_NUM, CUSTOMER_NAME, NUM_ORDERED, QUOTED_PRICE))

Functional Dependencies:
ITEM_NUM -> DESCRIPTION, ON_HAND, CATEGORY, STOREHOUSE, PRICE
ORDER_NUM -> ORDER_DATE, CUSTOMER_NUM
CUSTOMER_NUM -> CUSTOMER_NAME
ITEM_NUM, ORDER_NUM -> NUM_ORDERED, QUOTED_PRICE

3NF:
ITEM (ITEM_NUM, DESCRIPTION, ON_HAND, CATEGORY, STOREHOUSE, PRICE)
ORDERS (ORDER_NUM, ORDER_DATE, CUSTOMER_NUM)
CUSTOMER (CUSTOMER_NUM, CUSTOMER_NAME)
ORDER_LINE (ORDER_NUM, ITEM_NUM, NUM_ORDERED, QUOTED_PRICE)



5. Indicate the changes you need to make to the TAL Distributors database to support the following additional requirement. Each storehouse has a manager who is identified by a manager number, a manager last name, and a manager first name.

STOREHOUSE (<u>STOREHOUSE</u>, MANAGER_NUM)
MANAGER (<u>MANAGER_NUM</u>, LAST_NAME, FIRST_NAME)