



## Drawing the Entity-Relationship Diagram

The objective is to develop a simple system for managing customer purchase orders. First, you must identify the business entities involved and their relationships. To do that, you draw an entity-relationship (E-R) diagram by following the rules and examples given in [Figure 5-1](#).

**Figure 5-1 Rules for Drawing an E-R Diagram**

### Definitions:

**entity** something about which data is collected, stored, and maintained

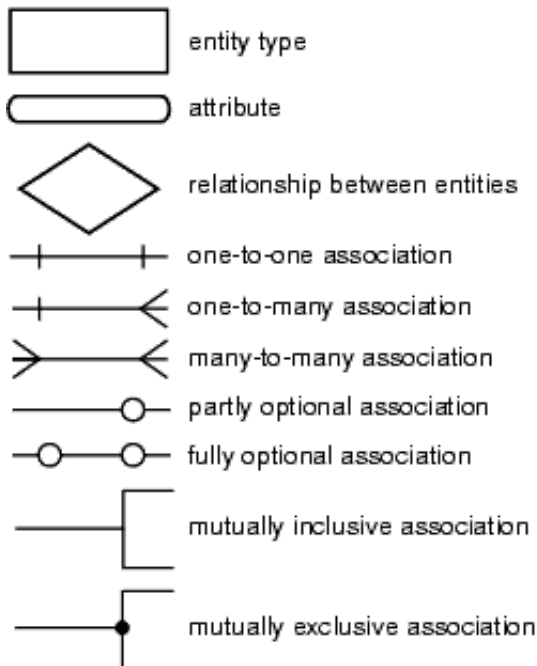
**attribute** a characteristic of an entity

**relationship** an association between entities

**entity type** a class of entities that have the same set of attributes

**record** an ordered set of attribute values that describe an instance of an entity type

### Symbols:

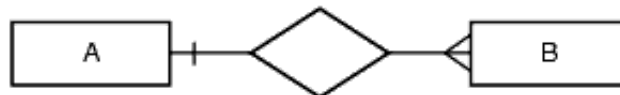


### Examples:

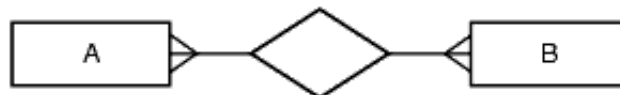
One A is associated with one B:



One A is associated with one or more B's:



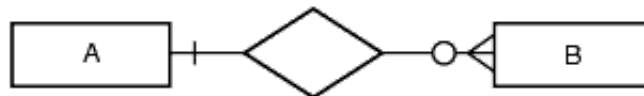
One or more A's are associated with one or more B's:



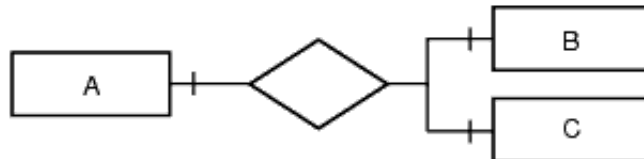
One A is associated with zero or one B:



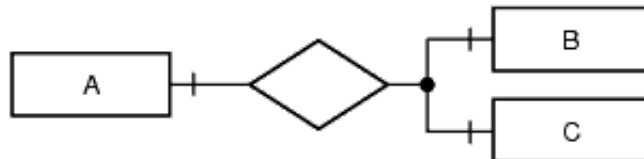
One A is associated with zero or more B's:



One A is associated with one B and one C:

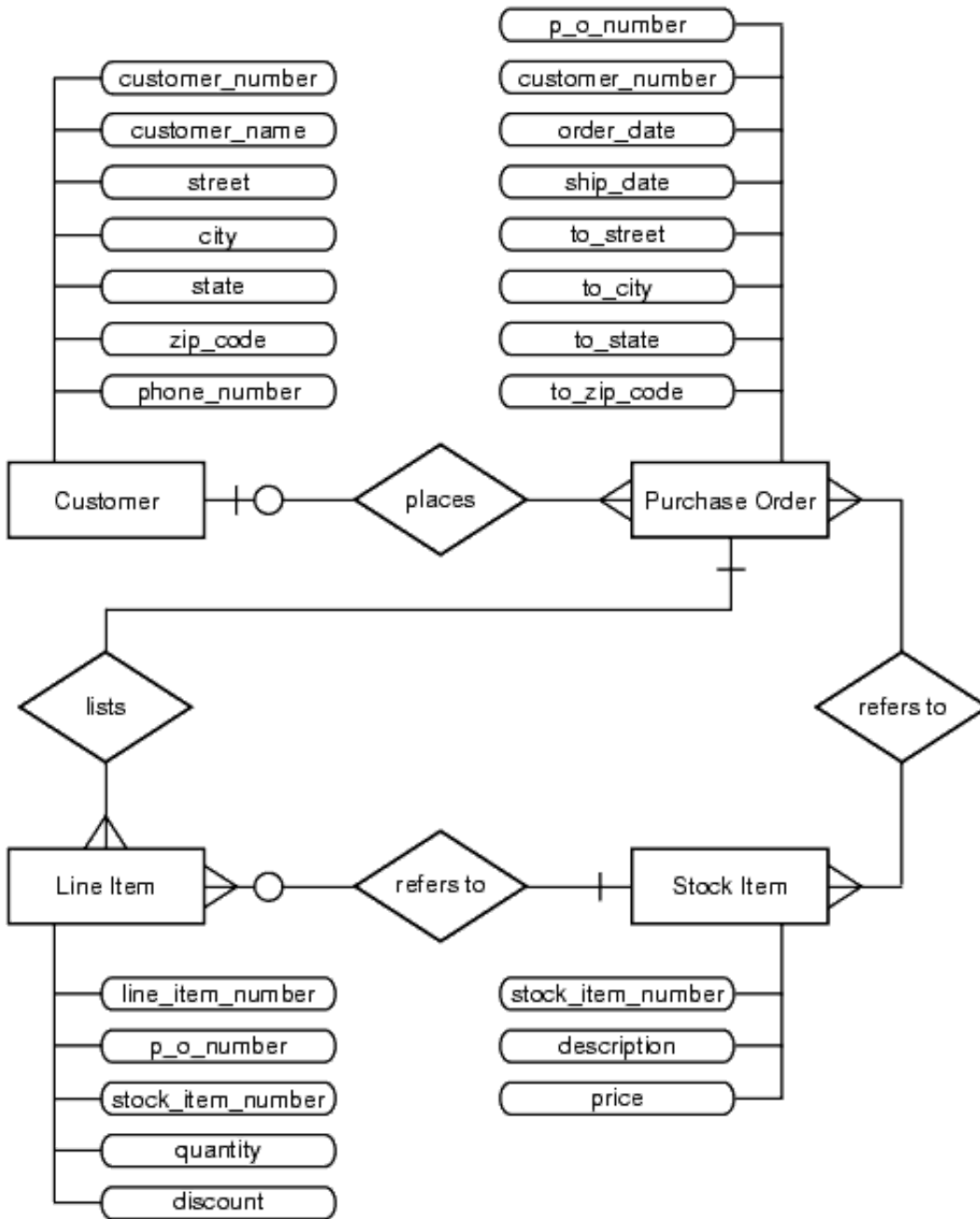


One A is associated with one B or one C (but not both):



As [Figure 5-2](#) illustrates, the basic entities in this example are customers, purchase orders, line items, and stock items.

**Figure 5-2 E-R Diagram for Purchase Order Application**



A Customer has a one-to-many relationship with a Purchase Order because a customer can place many orders, but a given purchase order can be placed by only one customer. The relationship is optional because zero customers might place a given order (it might be placed by someone not previously defined as a customer).

A Purchase Order has a many-to-many relationship with a Stock Item because a purchase order can refer to many stock items, and a stock item can be referred to by many purchase orders. However, you do not know which purchase orders refer to which stock items.

Therefore, you introduce the notion of a Line Item. A Purchase Order has a one-to-many relationship with a Line Item because a purchase order can list many line items, but a given line item can be listed by only one purchase order.

A LineItem has a many-to-one relationship with a StockItem because a line item can refer to only one stock item, but a given stock item can be referred to by many line items. The relationship is optional because zero line items might refer to a given stock item.



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[Contents](#)



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