



Integrity Constraints Specifications:

- Manufacturer produces products (one to zero-or-many)
- Manufacturers manufacture for Customers (one-or-many to zero-or many)
- Supplier supplies to Manufacturer (zero-or-many to zero-or-many)
- Supplier supplies to Customers (zero-or-many to zero-or-many)
- Shipment order (zero-or-many to zero-or-many)
- Product needs material (zero-or-many to one-or-many)
- Supplier supply items (one-or-many to zero-or-many as item must be supplied by a supplier but a supplier supplying can be optional.)
- Supplier has vol_discount (one to zero-or-many)
- Manufacturer has vol_discount (one to zero-or-many)
- Shippers price shipping services (one-or-many to zero-or-many as a shipping service must be charged by one or more shippers but shippers has an option of charging services)
- Shipper has vol_discount (one to zero-or-many)
- Customer demand items (zero-or-many to one-or-many)

Missing Information and suggested additional assumptions and briefly explained rationales.

- *The instructions don't describe address' sub attributes, but it is assumed that it is a composite attribute and contains sub attributes or parts.*
- *The volume discount is not shown in the ER diagram but the "volume discount is described by a percentage of deduction for amount above a predetermined bound".*
- *The instructions says that "Customers have demand quantity for certain Items" and since item ISA product and material, it can be assumed that a customer demands product and/or material.*
- *A shipper has a Shipment order and the shipment order contain attributes such as weight, price per lb, etc. The ER diagram doesn't show the calculation using weight and price.*
- *Shipper, Manufacturers, Suppliers all contain an order id it is assumed that there are separate and individual orders for entities, and thus the ER diagram doesn't show ORDER as a separate entity.*

-is the address attribute for supplier, manufacturer, customer, shipper a composite attribute? what are the sub-parts/attributes?

The address is a composite attribute and contains street, city, state, zip code, country as sub-attributes.

-supplier price per unit should be an attribute of the relationship since it can vary by supplier/item combination

Supplier price per unit is given as an attribute to the relationship 'supply' between supplier and item and to the relationship 'has' between supplier and supplier_order.

-the supplier "price" and "discount" does not appear to be related to "price per unit" of an item

The vol_discount and 'price_per_unit' are connected together through the relationship 'has'.

-volume discount threshold/predetermined amount (above which discount is applied) is not captured

The volume discount is not shown in the ER diagram but the "volume discount is described by a percentage of deduction for amount above a predetermined bound". This is also shown in the additional assumption and missing information section.

-manufacturer setup cost, and product cost per unit are attributes of the relationship. currently it is captured as part of the product item

The 'setUpCost' and "product cost per unit" are attributes of the relationship produces between manufacturer and product. It can be read as a manufacturer produces 0 or many products and the production have a setupcost and product cost per unit.

-manufacturer volume discount threshold not captured

The volume discount is not shown in the ER diagram but the "volume discount is described by a percentage of deduction for amount above a predetermined bound". This is also shown in the additional assumption and missing information section.

-shipper source, destination pair pricing is not captured

Shipper and business entity has relationship called 'shipping service' which has attributes of source, destination, and the price of this shipping service.

-shipping weight, price per pound (lb), volume discount not captured

The volume discount is not shown in the ER diagram but the "volume discount is described by a percentage of deduction for amount above a predetermined bound". This is also shown in the additional assumption and missing information section. A shipper has a Shipment order and the shipment order contain attributes such as weight, price per lb, etc. The ER diagram doesn't show the calculation using weight and price.

-no relationship between customer and product showing demand quantity

The customer and product are related and can the ER diagram can be read as "Customer demand an item; and item is a product." The relationship demand has a attribute called 'qty' aka quantity.