Database Management Systems

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Overview

- Review of Conceptual Data Model/Schema of Pine Valley Furniture Company – Case Study
  - Entity Description
  - Business Rules
  - ER Diagram

- Conceptual Design Exercise for the Pine Valley Furniture Company database

Entity Description
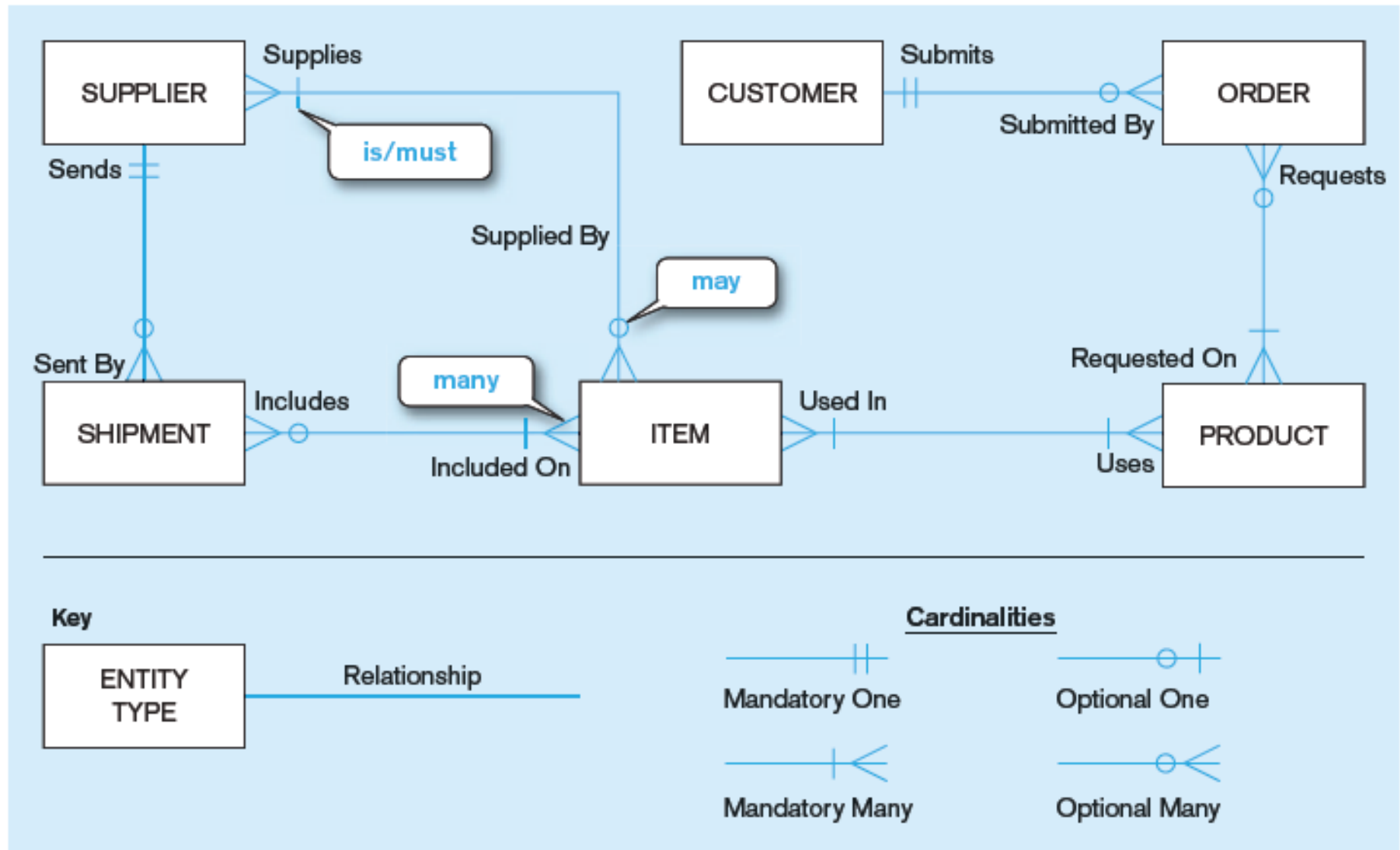
CUSTOMER	A person or an organization that has ordered or might order products. *Example*: L. L. Fish Furniture.
PRODUCT	A type of furniture made by Pine Valley Furniture that may be ordered by customers. Note that a product is not a specific bookcase, because individual bookcases do not need to be tracked. *Example*: A 6-foot, 5-shelf, oak bookcase called O600.
ORDER	The transaction associated with the sale of one or more products to a customer and identified by a transaction number from sales or accounting. *Example*: The event of L. L. Fish buying one product O600 and four products O623 on September 10, 2010.
ITEM	A type of component that goes into making one or more products and can be supplied by one or more suppliers. *Example*: A 4-inch ball-bearing caster called I-27–4375.
SUPPLIER	Another company that may provide items to Pine Valley Furniture. *Example*: Sure Fasteners, Inc.
SHIPMENT	The transaction associated with items received in the same package by Pine Valley Furniture from a supplier. All items in a shipment appear on one bill-of-lading document. *Example*: The receipt of 300 I-27-4375 and 200 I-27-4380 items from Sure Fasteners, Inc., on September 9, 2010.

Business Rules

1. A SUPPLIER <u>may</u> supply <u>many</u> ITEMs (by "may supply," we mean the supplier may not supply any items). Each ITEM <u>is</u> supplied by any number of SUPPLIERs (by "is supplied," we mean that the item <u>must</u> be supplied by at least one supplier). See annotations in Figure 2-1 that correspond to underlined words.
2. Each ITEM must be used in the assembly of at least one PRODUCT and may be used in many products. Conversely, each PRODUCT must use one or more ITEMs.
3. A SUPPLIER may send many SHIPMENTs. However, each shipment must be sent by exactly one SUPPLIER. Notice that sends and supplies are separate concepts. A SUPPLIER may be able to supply an item, but may not yet have sent any shipments of that item.
4. A SHIPMENT must include one (or more) ITEMs. An ITEM may be included on several SHIPMENTs.
5. A CUSTOMER may submit any number of ORDERs. However, each ORDER must be submitted by exactly one CUSTOMER. Given that a CUSTOMER may not have submitted any ORDERs, some CUSTOMERs must be potential, inactive, or some other customer possibly without any related ORDERs.
6. An ORDER must request one (or more) PRODUCTs. A given PRODUCT may not be requested on any ORDER, or may be requested on one or more orders.

ER Diagram

E-R Model Exercises

E-R Model Exercise (1)

- The company sells a number of different furniture products. These products are grouped into several product lines. The identifier for a product is Product_ID, while the identifier for a product line is Product_Line_ID. Following are additional attributes of the product: Product_Description, Product_Finish, and Unit_Price. Another attribute for product line is Product_Line_Name. A product line may group any number of products, but must group at least one product. Each product must belong to exactly one product line.

E-R Model Exercise (2)

- Customers submit orders for products. The identifier for an order is Order_ID, and another attribute is Order_Date. A customer may submit any number of orders, but need not submit any orders. Each order is submitted by exactly one customer. The identifier for a customer is Customer_ID. Other attributes include Customer_Name, Customer_Address, and Customer_Postal_Code.

E-R Model Exercise (3)

- A given customer order must request at least one product and only one product per order line item. Any product sold by Pine Valley Furniture may not appear on any order line item, or may appear on one or more order line items. An attribute associated with each order line item is Quantity, which is the number of units requested.

E-R Model Exercise (4)

- Pine Valley Furniture has established sales territories for its customers. Each customer may does business in any number of these sales territories or may not does business in any territory. The identifier for a sales territory is Territory_ID and another attribute is Territory_Name. A sales territory has one to many customers.

E-R Model Exercise (5)

- Pine Valley Furniture has several salespersons. The identifier for a salesperson is Salesperson_ID. Other attributes include Salesperson_Name, Salesperson_Telephone, and Salesperson_Fax. A salesperson serves exactly one sales territory. Each sales territory is served by one or more salespersons.

E-R Model Exercise (6)

- Each product is assembled from a specified quantity of one or more raw materials. The ident*ifier for the raw material entity is Material_ID. Other attributes include Unit_of_Measure, Material_Name, and Material_Standard_Cost. Each raw material is assembled into one or more products, using a specified quantity of the raw material for each product.

E-R Model Exercise (7)

- Raw materials are supplied by vendors. The identifier for a vendor is Vendor_ID. Other attributes include Vendor_Name and Vendor_Address. Each raw material can be supplied by one or more vendors. A vendor may supply any number of raw materials or may not supply any raw materials to Pine Valley Furniture. An attribute of the relationship between vendor and raw material is Unit_Price. It is the price a particular vendor takes to supply a particular raw material.

E-R Model Exercise (8)

- Pine Valley Furniture has established a number of work centers. The identifier for a work centers is Work_Center_ID. Another attribute is Location. Each product is produced in one or more work centers. A work center may be used to produce any number of products, or may not be used to produce any products.

E-R Model Exercise (9)

- The company has more than 100 employees. The identifier for employee is Employee_ID. Other attributes are Employee_Name, Employee_Address, and Skill. An employee may have more than one skill. Each employee may work in one or more work centers. A work center must have at least one employee working in that center, but may have any number of employees. A skill may be possessed by more than one employee or possibly no employees.

E-R Model Exercise (10)

- Each employee has exactly one supervisor; however, a manager has no supervisor. An employee who is a supervisor may supervise any number of employees, but not all employees are supervisors.

Task

- Complete all the exercises in this lecture and make combine ERD

Summary

- Reviewed Conceptual Data Modeling/Schema and covered its exercises