From a study of the business processes at Pine Valley Furniture Company, we have identified the following entity type. An identifier is also suggested for each entity, together with selected important attributes:

* The company sells a number of different furniture products. These products are grouped into several product line.s The identifier for a product is Product ID, whereas the identifier for a product line is Product Line ID. We identify the following additional attributes for produst: Produst Description, Product Finish, and Product Standard Price. Anther 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.
* 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.
* 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 Ordered Quantity.
* Pine Valley Furniture has established sales territories for its customers. Each customer may do business in any number of these sales territories or may not do business in any territory. A sales territory has one to many customers. The identifier for a sales territory is Territory ID and an attribute is Territory Name.
* Pine Valley Furniture company 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.
* Each product is assembled from a special quantity of one or more raw materials. The identifier 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.
* 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. Supply Unit Price is the unit price at which a particular vendor supplies a particular raw material.
* Pine Valley Furniture has established a number of word centers.The identifier for a work center is Work Center ID.Another attribute is Work Center 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.
* The company has more than 100 employees.The identifier for employee is Employee ID.Other attribute include 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 employee.
* Each employee has exactly one supervisor;however,a manager has no supervisor.An employee who is a supervisor may supervise any number of employee,but not all employee are supervisors.

DATABASE PROCESSING AT PINE VALLEY FURNITURE

The purpose of the data model diagram in Figure2-21 is to provide a conceptual design for the Pine Valley Furniture Company database.It is important to check the quality of such a design through frequent interaction with the persons who will use the database

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example of describing history for a relationship is “Places links a customer with the orders he or she has placed with our company and links an order with the associated customer . Only two years of orders are maintained in the database ,so not all orders can participate in this relationship .’’

* A relationship definition should explain whether an entity instance involved in a relationship instance can transfer participation to another relationship instance . For example ,’’Places links a customer with the orders he or she has placed with our company and links an order with the associated customer . An order is not transferable to another customer.’’ Another example is “Categorized As links a product line with the products sold under that heading and links a product to its associated product line. Due to changes in organization structure and product design features, products may be recategorized to a different product line. Categorized As keeps track of only the current product line to which a product is linked.”

E-R MODELING EXAMPLE: PINE VALLEY FURNITURE COMPANY

Developing an E-R diagram can proceed from one (or both) of two perspectives. With a top-down perspective, the designer proceeds from basic description of the business, including its policies, processes, and environment. This approach is most appropriate for developing a high-level E-R diagram with only the major entities and relationship and with a limited set of attributes (such as just the entity identifiers).With a bottom-up approach, the designer proceeds from detailed discussions with users, and from a detailed study of documents,screens, and other data sources. This approach is necessary for developing a detailed,”fully attributed’’ E-R diagram.

In this section, we develop a high-level ERD for Pine Valley Furniture Company, based largely on the first of these approaches (see Figure 2-21 for a Microsoft.Visio version).For simplicity,we do not show any composite or multivalued attributes(e.g.skill is shown as a separate entity type associated with EMPLOYEE via an associative entity,which allows an employee to have many skills and a skill to be held by many employees)

Figure 2-21 provides many examples of common E-R modeling notations,and hence,it can be used as an excellent review of what you have learned in this chapter.In a moment,we will explain the business rules that are represented in this figure.However,before you read that explanation, one way to use Figure 2-21 is to search for typical E-R model constructs in it,such as one-to-many,binary,or unary relationships.Then,ask yourself why the business data was modeled this way.For example,ask yourself.

* Where is a unary relationship,what does it mean,and for what reasons might the cardinalities on it be different in other organizations?
* Why is Includes a one-to-many relationship,and why might this ever be different in some other organization?
* Does Includes allow for a product to be represented in the database before it is assigned to a product line(e.g.,while the product is in research and development)?
* If there were a different customer contact person for each sales territory in which a customer did business,where in the data model would we place this person’s name?
* What is the meaning of the Does Business In associative entity,and why does each Does Business In instance have to be associated with exactly one SALES TERRITORY and one CUSTOMER?
* In what way might Pine Valley change the way it does business that would cause the Supplies associative entity to be eliminated and the relationships around it to change?

Each of these questions is included in Problem and Exercise 3 at the end of the chapter,but suggest you use these now as a way to review your understanding of E-R diagramming.