The first step in database development is database analysis,in which we determine user requirements for data and develop data models to represent those requirements.The two chapters in part 2 describe in depth the de facto standard for conceptual data modeling--entity-relationship diagramming. A conceptual data model represents data from the viewpoint of the organization,independent of any technology that will be used to implement the model.

Chapter 2 (“modeling data in the organization”)begins by describing business rules,which are the policies and rules about the operation of a business that a data model represents.characteristics of good business rules are described,and the process of gathering business rules is discussed.general guidelines for naming and defining elements of data model are presented within the context of business rules.

Chapter 2 introduces the notations and main constructs of this modeling technique,including entities,relationships,and attributes;for each construct,we provide specific guidelines for naming and defining these elements of a data model.We distinguish between strong and weak entity types and the use of identitying relationships.We describe different types of attributes,including required versus optional attributes,simple versus composite attributes,single-valued versus multivalued attributes,derived attributes,and identifiers.We contrast relationship types and instances and introduce associative entities.We describe and illustrate relationships of various degrees,including unary,binary,and ternary relationships.We also describe the various relationship cardinalities that arise in modeling situations.We discuss the common problem of how to model time-dependent data.Finally,we describe the situation in which multiple relationships are defined between a given set of entities.The E-R modeling concepts are illustrated with an extended example for pine valley Furniture Company.This final example,as well as a few other examples throughout the chapter,is presented using Microsoft Visio,which shows how many data modeling tools represent data models.

Chapter 3(“The Enhanced E-R Model”)presents advanced cpncepts in E-R modeling;these additional modeling features ard often required to cope with the increasingly complex business environment encountered in organizations today.

The most important modeling construct incorporated in the enhanced entity-relationship (EER) diagram is supertype/subtype relationships.This facility allows us to model a general entity type (called a supertype) and then subdivide it into several specialized dntity types called subtypes.For example,sports cars and sedans are subtypes of automobiles.We introduce a simple notation for representing supertype/subtype relationships and sevdral refinements.We also introduce generalization and specialization as two contrasting techniques for identifying supertype/subtype relationships.Supertype/ subtype notation is necessary for the increasingly popular universal data model,which is motivated and explained in Chapter 3.

The concept of patterns has become a central element of many information systems development methodologies.The notion is that there are reusable component designs that can be combined and tailored to meet new information system requests.In the database world,these patterns are call universal data models,prepackaged data models,or logical datqa models.These patterns can be purchased or may be inherent in a commercial off-the-shelf package,such as an ERP or CRM application.Increasingly,it is from these patterns that new databases are designed.In Chapter 3,we describe the usefulness of such patterns and outline a modification of the database development process when such patterns are the starting poing.Universal industry or business function data models extensively use the extended entity-relationship diagramming notations introduced in this.

The conceptual data modeling concepts presented in the two chapters in Part 2 provide the foundation for your career in database analysis and design.As a database analyst,you will be expected to apply the E-R notation in modeling user requirements for data and information.