CHAPTER 2: DATA MODELS

1. A data model is usually graphical.
   a. True
   b. False

   ANSWER: True

2. An implementation-ready data model needn't necessarily contain enforceable rules to guarantee the integrity of the data.
   a. True
   b. False

   ANSWER: False

3. An implementation-ready data model should contain a description of the data structure that will store the end-user data.
   a. True
   b. False

   ANSWER: True

4. Within the database environment, a data model represents data structures with the purpose of supporting a specific problem domain.
   a. True
   b. False

   ANSWER: True

5. Even when a good database blueprint is available, an applications programmer's view of the data should match that of the manager and the end user.
   a. True
   b. False

   ANSWER: False

6. In the context of data models, an entity is a person, place, thing, or event about which data will be collected and stored.
   a. True
   b. False

   ANSWER: True

7. Database designers determine the data and information that yield the required understanding of the entire business.
   a. True
   b. False

   ANSWER: False

8. Business rules apply to businesses and government groups, but not to other types of organizations such as religious groups or research laboratories.
   a. True
   b. False

   ANSWER: False

9. Business rules must be rendered in writing.
   a. True
   b. False

   ANSWER: True

10. In an SQL-based relational database, each table is dependent on every other table.
    a. True
    b. False

    ANSWER: False

11. In an SQL-based relational database, rows in different tables are related based on common values in common attributes.
    a. True
    b. False

    ANSWER: True

12. A disadvantage of the relational database management system (RDBMS) is its inability to hide the complexities of the relational model from the user.
    a. True
    b. False

    ANSWER: False

13. Each row in the relational table is known as an entity instance or entity occurrence in the ER model.
    a. True
    b. False

    ANSWER: True

14. In Chen notation, entities and relationships have to be oriented horizontally; not vertically.
    a. True
    b. False

    ANSWER: False

15. M:N relationships are not appropriate in a relational model.
    a. True
    b. False

    ANSWER: True

16. Today, most relational database products can be classified as object/relational.
    a. True
    b. False

    ANSWER: True

17. The network model has structural level dependence.
    a. True
    b. False

    ANSWER: True

18. The external model is the representation of the database as "seen" by the DBMS.
    a. True
    b. False

    ANSWER: False

19. The hierarchical model is software-independent.
    a. True
    b. False

    ANSWER: False

20. The relational model is hardware-dependent and software-independent.
    a. True
    b. False

    ANSWER: False

21. A(n)_____'s main function is to help one understand the complexities of the real-world environment.
    a. node   b. entity
    c. model   d. database

    ANSWER: c

22. A(n)_____represents a particular type of object in the real world.
    a. attribute   b. entity
    c. relationship   d. node

    ANSWER: b

23. A(n)_____is anything about which data are to be collected and stored.
    a. attribute   b. entity
    c. relationship   d. constraint

    ANSWER: b

24. A(n)_____is the equivalent of a field in a file system.
    a. attribute   b. entity
    c. relationship   d. constraint

    ANSWER: a

25. A(n)_____is bidirectional.
    a. attribute   b. entity
    c. relationship   d. constraint

    ANSWER: c

26. A(n)_____is a restriction placed on the data.
    a. attribute   b. entity
    c. relationship   d. constraint

    ANSWER: d

27. _____are important because they help to ensure data integrity.
    a. Attributes   b. Entities
    c. Relationships   d. Constraints

    ANSWER: d

28. _____are normally expressed in the form of rules.
    a. Attributes   b. Entities
    c. Relationships   d. Constraints

    ANSWER: d

29. Students and classes have a_____relationship.
    a. one-to-one   b. one-to-many
    c. many-to-one   d. many-to-many

    ANSWER: d

30. From a database point of view, the collection of data becomes meaningful only when it reflects properly defined_____.
    a. business rules
    b. business norms
    c. business goals
    d. business plans

    ANSWER: a

31. Which of the following is true of business rules?
    a. They allow the designer to set company policies with regard to data.
    b. They allow the designer to develop business processes.
    c. They can serve as a communication tool between the users and designers.
    d. They provide a framework for the company's self-actualization.

    ANSWER: c

32. A noun in a business rule translates to a(n)_____in the data model.
    a. entity   b. attribute
    c. relationship   d. constraint

    ANSWER: a

33. A verb associating two nouns in a business rule translates to a(n)_____in the data model.
    a. entity   b. attribute
    c. relationship   d. constraint

    ANSWER: c

34. The hierarchical data model was developed in the_____.
    a. 1960s   b. 1970s
    c. 1980s   d. 1990s

    ANSWER: a

35. The object-oriented data model was developed in the_____.
    a. 1960s   b. 1970s
    c. 1980s   d. 1990s

    ANSWER: c

36. VMS/VSAM is an example of the_____.
    a. hierarchical model   b. file system data model
    c. relational data model   d. XML data model

    ANSWER: b

37. Oracle 11g is an example of the_____.
    a. hierarchical model   b. file system data model
    c. relational data model   d. XML/Hybrid data model

    ANSWER: d

38. MySQL is an example of the_____.
    a. hierarchical model   b. file system data model
    c. relational data model   d. XML data model

    ANSWER: c

39. In the _____ model, the basic logical structure is represented as an upside-down tree.
    a. hierarchical   b. network
    c. relational   d. entity relationship

    ANSWER: a

40. In the _____ model, each parent can have many children, but each child has only one parent.
    a. hierarchical   b. network
    c. relational   d. entity relationship

    ANSWER: a

41. The relational data model was developed in the _____.
    a. 1960s   b. 1970s
    c. 1980s   d. 1990s

    ANSWER: b

42. In the _____ model, the user perceives the database as a collection of records in 1:M relationships, where each record can have more than one parent.
    a. hierarchical   b. network
    c. object-oriented   d. entity relationship

    ANSWER: b

43. The _____ model was developed to allow designers to use a graphical tool to examine structures rather than describing them with text.
    a. hierarchical   b. network
    c. object-oriented   d. entity relationship

    ANSWER: d

44. A(n) _____ enables a database administrator to describe schema components.
    a. extensible markup language (XML)   b. data definition language (DDL)
    c. unified modeling language (UML)   d. query language

    ANSWER: b

45. Which of the following types of HDFS nodes stores all the metadata about a file system?
    a. Data node   b. Client node
    c. Name node   d. Map node

    ANSWER: c

46. Which of the following types of HDFS nodes acts as the interface between the user application and the HDFS?
    a. Data node   b. Client node
    c. Name node   d. Map node

    ANSWER: b

47. Which of the following is a disadvantage of the hierarchical data model?

    a. It does not promote data sharing.   b. It is not efficient with 1:M relationships.

    c. It does not promote data integrity.   d. It does not have standards.

    ANSWER: d

48. NoSQL databases:

    a. are geared toward transaction consistency; not performance.   b. support only small amounts of sparse data.

    c. are based on the relational model.   d. provide fault tolerance.

    ANSWER: d

49. The_____model uses the term connectivity to label the relationship types.

    a. relational   b. network

    c. object-oriented   d. entity relationship

    ANSWER: d

50. Which of the following is true of NoSQL databases?

    a. They do not support distributed database architectures.   b. They are not based on the relational model.

    c. They are geared toward transaction consistency rather than performance.   d. They do not support very large amounts of sparse data.

    ANSWER: b

51. The_____data model is said to be a semantic data model.

    a. relational   b. network

    c. object-oriented   d. entity relationship

    ANSWER: c

52. The_____data model uses the concept of inheritance.

    a. relational   b. network

    c. object-oriented   d. entity relationship

    ANSWER: c

53. One of the limitations of the_____model is that there is a lack of standards.

    a. hierarchical   b. network

    c. relational   d. entity relationship

    ANSWER: a

54. The_____model is the end users' view of the data environment.

    a. abstract   b. external

    c. conceptual   d. internal

    ANSWER: b

55. An internal_____refers to a specific representation of an internal model, using the database constructs supported by the chosen database.
    a. tuple   b. schema
    c. object   d. value

    ANSWER: b

56. A(n)_____is a relatively simple representation of more complex real-world data structures.

    ANSWER: data model

57. A(n)_____is a brief, precise, and unambiguous description of a policy, procedure, or principle within a specific organization.

    ANSWER: business rule

58. A(n)_____in a hierarchical model is the equivalent of a record in a file system.

    ANSWER: segment

59. A(n)_____is the conceptual organization of an entire database as viewed by a database administrator.

    ANSWER: schema

60. The relational model's foundation is a mathematical concept known as a_____.

    ANSWER: relation

61. Each row in a relation is called a(n)_____.

    ANSWER: tuple

62. Each column in a relation represents a(n)_____.

    ANSWER: attribute

63. A(n)_____defines the environment in which data can be managed and is used to work with the data in the database.

    ANSWER: data manipulation language (DML)

64. Each row in the relational table is known as a(n)_____.

    ANSWER: entity instance

65. In_____, a three-pronged symbol represents the "many" side of the relationship.

    ANSWER: Crow's Foot notation

66. A(n)_____is a collection of similar objects with a shared structure and behavior.

    ANSWER: class

67. In object-oriented terms, a(n)_____defines an object's behavior.

    ANSWER: method

68. _____is a language based on OO concepts that describes a set of diagrams and symbols used to graphically model a system.

    ANSWER: UML (Unified Modeling Language)
                     Unified Modeling Language (UML)
                     Unified Modeling Language
                     UML

69. The term_____is used to refer to the task of creating a conceptual data model that could be implemented in any DBMS.

    ANSWER: logical design

70. The_____is the representation of a database as "seen" by the DBMS.

    ANSWER: internal model

71. What components should an implementation-ready data model contain?

    ANSWER: An implementation-ready data model should contain at least the following components:
                  A description of the data structure that will store the end-user data.
                  A set of enforceable rules to guarantee the integrity of the data.
                  A data manipulation methodology to support the real-world data transformations.

72. What do business rules require to be effective?

    ANSWER: To be effective, business rules must be easy to understand and widely disseminated to ensure that every person in the organization shares a common interpretation of the rules. Business rules describe, in simple language, the main and distinguishing characteristics of the data as viewed by the company.

73. What are the sources of business rules, and what is the database designer's role with regard to business rules?

    ANSWER: The main sources of business rules are company managers, policy makers, department managers, and written documentation such as a company's procedures, standards, and operations manuals. A faster and more direct source of business rules is direct interviews with end users. Unfortunately, because perceptions differ, end users are sometimes a less reliable source when it comes to specifying business rules. For example, a maintenance department mechanic might believe that any mechanic can initiate a maintenance procedure, when actually only mechanics with inspection authorization can perform such a task. Such a distinction might seem trivial, but it can have major legal consequences. Although end users are crucial contributors to the development of business rules, it pays to verify end-user perceptions. Too often, interviews with several people who perform the same job yield very different perceptions of what the job components are. While such a discovery may point to "management problems," that general diagnosis does not help the database designer. The database designer's job is to reconcile such differences and verify the results of the reconciliation to ensure that the business rules are appropriate and accurate.

Chapter 2: Data Models

74. Describe the three parts involved in any SQL-based relational database application.

ANSWER: From an end-user perspective, any SQL-based relational database application involves three parts: a user interface, a set of tables stored in the database, and the SQL "engine." Each of these parts is explained below.

1. The end-user interface. Basically, the interface allows the end user to interact with the data (by automatically generating SQL code). Each interface is a product of the software vendor's idea of meaningful interaction with the data. You can also design your own customized interface with the help of application generators that are now standard fare in the database software arena.

2. A collection of tables stored in the database. In a relational database, all data are perceived to be stored in tables. The tables simply "present" the data to the end user in a way that is easy to understand. Each table is independent. Rows in different tables are related by common values in common attributes.

3. SQL engine. Largely hidden from the end user, the SQL engine executes all queries, or data requests. Keep in mind that the SQL engine is part of the DBMS software. The end user uses SQL to create table structures and to perform data access and table maintenance. The SQL engine processes all user requests—largely behind the scenes and without the end user's knowledge. Hence, SQL is said to be a declarative language that tells what must be done but not how.

75. Describe the conceptual model and its advantages. What is the most widely used conceptual model?

ANSWER: The conceptual model represents a global view of the entire database by the entire organization. That is, the conceptual model integrates all external views (entities, relationships, constraints, and processes) into a single global view of the data in the enterprise. Also known as a conceptual schema, it is the basis for the identification and high-level description of the main data objects (avoiding any database model- specific details).

The most widely used conceptual model is the ER model. Remember that the ER model is illustrated with the help of the ERD, which is effectively the basic database blueprint. The ERD is used to graphically represent the conceptual schema.

The conceptual model yields some important advantages. First, it provides a bird's-eye (macro level) view of the data environment that is relatively easy to understand.

Second, the conceptual model is independent of both software and hardware. Software independence means that the model does not depend on the DBMS software used to implement the model. Hardware independence means that the model does not depend on the hardware used in the implementation of the model. Therefore, changes in either the hardware or the DBMS software will have no effect on the database design at the conceptual level. Generally, the term logical design refers to the task of creating a conceptual data model that could be implemented in any DBMS.