Chapter 01: Database Systems

True / False

1. Data and information are essentially the same thing.
   a. True
   b. False
ANSWER: False
DIFFICULTY: Easy
REFERENCES: 1-2 Data versus Information
LEARNING OBJECTIVES: 01.01 - Define the difference between data and information

2. Data processing can be as simple as organizing data to reveal patterns.
   a. True
   b. False
ANSWER: True
DIFFICULTY: Easy
REFERENCES: 1-2 Data versus Information
LEARNING OBJECTIVES: 01.01 - Define the difference between data and information

3. Data is the result of processing raw facts to reveal its meaning.
   a. True
   b. False
ANSWER: False
DIFFICULTY: Easy
REFERENCES: 1-2 Data versus Information
LEARNING OBJECTIVES: 01.01 - Define the difference between data and information

4. When data are entered into a form and saved, they are placed in the underlying database as knowledge.
   a. True
   b. False
ANSWER: False
DIFFICULTY: Moderate
REFERENCES: 1-2 Data versus Information
LEARNING OBJECTIVES: 01.01 - Define the difference between data and information

5. Data constitute the building blocks of information.
   a. True
   b. False
ANSWER: True
DIFFICULTY: Easy
REFERENCES: 1-2 Data versus Information
LEARNING OBJECTIVES: 01.01 - Define the difference between data and information

6. Metadata describe the data characteristics and the set of relationships that links the data found within the database.
   a. True
   b. False

ANSWER: True
DIFFICULTY: Easy
REFERENCES: 1-3 Introducing the Database
LEARNING OBJECTIVES: 01.02 - Describe what a database is, the various types of databases, and why they are valuable assets for decision making

7. The only way to access the data in a database is through the DBMS.
   a. True
   b. False

ANSWER: True
DIFFICULTY: Moderate
REFERENCES: 1-3a Role and Advantages of the DBMS
LEARNING OBJECTIVES: 01.02 - Describe what a database is, the various types of databases, and why they are valuable assets for decision making

8. Database programming languages receive all application requests and translate them into the complex operations required to fulfill those requests.
   a. True
   b. False

ANSWER: False
DIFFICULTY: Moderate
REFERENCES: 1-3a Role and Advantages of the DBMS
LEARNING OBJECTIVES: 01.02 - Describe what a database is, the various types of databases, and why they are valuable assets for decision making

9. The DBMS reveals much of the database's internal complexity to the application programs and users.
   a. True
   b. False

ANSWER: False
DIFFICULTY: Moderate
REFERENCES: 1-3a Role and Advantages of the DBMS
LEARNING OBJECTIVES: 01.02 - Describe what a database is, the various types of databases, and why they are valuable assets for decision making

10. One disadvantage of the DBMS is that it increases the risk of data security breaches.
   a. True
   b. False

ANSWER: False
DIFFICULTY: Easy
REFERENCES: 1-3a Role and Advantages of the DBMS
LEARNING OBJECTIVES: 01.02 - Describe what a database is, the various types of databases, and why they are valuable assets for decision making

11. An operational database is sometimes referred to as an enterprise database.
   a. True
   b. False

ANSWER: False
DIFFICULTY: Easy
REFERENCES: 1-3b Types of Databases
LEARNING OBJECTIVES: 01.02 - Describe what a database is, the various types of databases, and why they are valuable assets for decision making

12. A data warehouse can store data derived from many sources.
    a. True
    b. False
ANSWER: True
DIFFICULTY: Easy
REFERENCES: 1-3b Types of Databases
LEARNING OBJECTIVES: 01.02 - Describe what a database is, the various types of databases, and why they are valuable assets for decision making

13. Structure is based on the type of processing to be performed on the data.
    a. True
    b. False
ANSWER: True
DIFFICULTY: Moderate
REFERENCES: 1-3b Types of Databases
LEARNING OBJECTIVES: 01.02 - Describe what a database is, the various types of databases, and why they are valuable assets for decision making

14. Corporations use only structured data.
    a. True
    b. False
ANSWER: False
DIFFICULTY: Moderate
REFERENCES: 1-3b Types of Databases
LEARNING OBJECTIVES: 01.02 - Describe what a database is, the various types of databases, and why they are valuable assets for decision making

15. Field refers to a collection of related records.
    a. True
    b. False
ANSWER: False
DIFFICULTY: Easy
REFERENCES: 1-5b Computerized File Systems
LEARNING OBJECTIVES: 01.04 - See how modern databases evolved from file systems

16. Structural dependence exists when it is possible to make changes in the file structure without affecting the application program's ability to access the data.
    a. True
    b. False
ANSWER: False

DIFFICULTY: Moderate
REFERENCES: 1-6a Structural and Data Dependence
LEARNING OBJECTIVES: 01.05 - Understand flaws in file system data management

17. One disadvantage of a database system over previous data management approaches is increased costs.
    a. True
    b. False
ANSWER: True
DIFFICULTY: Easy
REFERENCES: 1-7c Managing the Database System: A Shift in Focus
LEARNING OBJECTIVES: 01.05 - Understand flaws in file system data management

18. Data anomaly is defined as the condition in which all of the data in the database are consistent with the real-world events and conditions.
    a. True
    b. False
ANSWER: False
DIFFICULTY: Easy
REFERENCES: 1-6b Data Redundancy
LEARNING OBJECTIVES: 01.05 - Understand flaws in file system data management

19. An advantage of database systems is that you needn't perform frequent updates and apply latest patches.
    a. True
    b. False
ANSWER: False
DIFFICULTY: Moderate
REFERENCES: 1-7c Managing the Database System: A Shift in Focus
LEARNING OBJECTIVES: 01.06 - Outline the main components of the database system

20. One advantage of a database system over previous data management approaches is that the database system is considerably less complex.
    a. True
    b. False
ANSWER: False
DIFFICULTY: Moderate
REFERENCES: 1-7c Managing the Database System: A Shift in Focus
LEARNING OBJECTIVES: 01.06 - Outline the main components of the database system

Multiple Choice

21. _____ is the result of revealing the meaning of raw facts.
    a. End-user data b. An encoded sample
    c. An encrypted bit d. Information
ANSWER: d
DIFFICULTY: Easy

REFERENCES: 1-2 Data versus Information
LEARNING OBJECTIVES: 01.01 - Define the difference between data and information

22. _____ is the body of information and facts about a specific subject.
a. Validation b. A format
c. Knowledge d. A database
ANSWER: c
DIFFICULTY: Easy
REFERENCES: 1-2 Data versus Information
LEARNING OBJECTIVES: 01.01 - Define the difference between data and information

23. Accurate, relevant, and timely information is the key to ____.
a. data management b. good decision making
c. knowledge d. understanding
ANSWER: b
DIFFICULTY: Moderate
REFERENCES: 1-2 Data versus Information
LEARNING OBJECTIVES: 01.01 - Define the difference between data and information

24. End-user data is _____.
a. knowledge about the end users b. raw facts of interest to the end user
c. information about a specific subject d. accurate, relevant and timely information
ANSWER: b
DIFFICULTY: Easy
REFERENCES: 1-3 Introducing the Database
LEARNING OBJECTIVES: 01.02 - Describe what a database is, the various types of databases, and why they are valuable assets for decision making

25. _____ provide a description of the data characteristics and the set of relationships that link the data found within the database.
a. Queries b. End-user data
c. Metadata d. Schemas
ANSWER: c
DIFFICULTY: Easy
REFERENCES: 1-3 Introducing the Database
LEARNING OBJECTIVES: 01.02 - Describe what a database is, the various types of databases, and why they are valuable assets for decision making

26. _____ serve as the intermediary between the user and the database.
a. DBMSs b. Metadata
c. End-user data d. Programming languages
ANSWER: a
DIFFICULTY: Easy
REFERENCES: 1-3a Role and Advantages of the DBMS
LEARNING OBJECTIVES: 01.02 - Describe what a database is, the various types of databases, and why they are valuable assets for decision making

27. The database structure in a DBMS is stored as a _____.

a. single file b. collection of files

c. set of key/value pairs d. collection of queries

ANSWER: b

DIFFICULTY: Easy

REFERENCES: 1-3a Role and Advantages of the DBMS

LEARNING OBJECTIVES: 01.02 - Describe what a database is, the various types of databases, and why they are valuable assets for decision making

28. A(n) _____ might be written by a programmer or it might be created through a DBMS utility program.

a. query b. operating system

c. database management system d. application

ANSWER: d

DIFFICULTY: Easy

REFERENCES: 1-3a Role and Advantages of the DBMS

LEARNING OBJECTIVES: 01.02 - Describe what a database is, the various types of databases, and why they are valuable assets for decision making

29. _____ exists when different versions of the same data appear in different places.

a. Data inconsistency b. Poor data security

c. Structural dependence d. Conceptual dependence

ANSWER: a

DIFFICULTY: Easy

REFERENCES: 1-3a Role and Advantages of the DBMS

LEARNING OBJECTIVES: 01.02 - Describe what a database is, the various types of databases, and why they are valuable assets for decision making

30. The response of the DBMS to a query is the _____

a. ad hoc query b. ad hoc response

c. query result set d. integrated view of the data

ANSWER: c

DIFFICULTY: Easy

REFERENCES: 1-3a Role and Advantages of the DBMS

LEARNING OBJECTIVES: 01.02 - Describe what a database is, the various types of databases, and why they are valuable assets for decision making

31. A(n) _____ database is used by an organization and supports many users across many departments.

a. desktop b. workgroup

c. enterprise d. transactional

ANSWER: c

DIFFICULTY: Easy

REFERENCES: 1-3b Types of Databases

LEARNING OBJECTIVES: 01.02 - Describe what a database is, the various types of databases, and why they are valuable assets for decision making

32. A(n) _____ database supports a relatively small number of users (usually fewer than 50) or a specific department within an organization.

a. desktop b. workgroup

c. enterprise d. transactional

ANSWER: b

DIFFICULTY: Easy

REFERENCES: 1-3b Types of Databases

LEARNING OBJECTIVES: 01.02 - Describe what a database is, the various types of databases, and why they are valuable assets for decision making

33. A workgroup database is a(n) _____ database.

a. single-user b. multiuser

c. desktop d. distributed

ANSWER: b

DIFFICULTY: Easy

REFERENCES: 1-3b Types of Databases

LEARNING OBJECTIVES: 01.02 - Describe what a database is, the various types of databases, and why they are valuable assets for decision making

34. A desktop database is a _____ database.

a. single-user b. multiuser

c. workgroup d. distributed

ANSWER: a

DIFFICULTY: Easy

REFERENCES: 1-3b Types of Databases

LEARNING OBJECTIVES: 01.02 - Describe what a database is, the various types of databases, and why they are valuable assets for decision making

35. A data warehouse contains historical data obtained from the _____.

a. operational databases b. desktop database

c. enterprise databases d. workgroup databases

ANSWER: a

DIFFICULTY: Easy

REFERENCES: 1-3b Types of Databases

LEARNING OBJECTIVES: 01.02 - Describe what a database is, the various types of databases, and why they are valuable assets for decision making

36. _____ data exist in the format in which they were collected.

a. Structured b. Semistructured

c. Unstructured d. Historical

ANSWER: c

DIFFICULTY: Easy

REFERENCES: 1-3b Types of Databases

LEARNING OBJECTIVES: 01.02 - Describe what a database is, the various types of databases, and why they are valuable assets for decision making

37. _____ data exist in a format that does not lend itself to processing that yields information.
a. Structured b. Semistructured
c. Unstructured d. Historical
ANSWER: c
DIFFICULTY: Easy
REFERENCES: 1-3b Types of Databases
LEARNING OBJECTIVES: 01.02 - Describe what a database is, the various types of databases, and why they are valuable assets for decision making

38. _____ are the result of formatting disorganized data in order to facilitate storage, use and generation of information.
a. Structured data b. Raw data
c. Unstructured data d. Obsolete data
ANSWER: a
DIFFICULTY: Easy
REFERENCES: 1-3b Types of Databases
LEARNING OBJECTIVES: 01.02 - Describe what a database is, the various types of databases, and why they are valuable assets for decision making

39. Most data that can be encountered are best classified as _____.
a. structured b. semistructured
c. unstructured d. historical
ANSWER: b
DIFFICULTY: Easy
REFERENCES: 1-3b Types of Databases
LEARNING OBJECTIVES: 01.02 - Describe what a database is, the various types of databases, and why they are valuable assets for decision making

40. An XML database supports the storage and management of _____ XML data.
a. structured b. multistructured
c. fullystructured d. semistructured
ANSWER: d
DIFFICULTY: Easy
REFERENCES: 1-3b Types of Databases
LEARNING OBJECTIVES: 01.02 - Describe what a database is, the various types of databases, and why they are valuable assets for decision making

41. The organization of data within folders in a manual file system is determined by _____.
a. its date of creation b. its expected use
c. the title of the documents in the folder d. the data processing specialist
ANSWER: b
DIFFICULTY: Moderate
REFERENCES: 1-5a Manual File Systems
LEARNING OBJECTIVES: 01.04 - See how modern databases evolved from file systems

42. A _____ is a logically connected set of one or more fields that describes a person, place, or thing.
a. database b. column

c. record d. file
ANSWER: c
DIFFICULTY: Easy
REFERENCES: 1-5b Computerized File Systems
LEARNING OBJECTIVES: 01.04 - See how modern databases evolved from file systems

43. A _____ is a collection of related records.
a. schema b. field
c. column d. file
ANSWER: d
DIFFICULTY: Easy
REFERENCES: 1-5b Computerized File Systems
LEARNING OBJECTIVES: 01.04 - See how modern databases evolved from file systems

44. A _____ is a character or group of characters that has a specific meaning.
a. database b. field
c. record d. file
ANSWER: b
DIFFICULTY: Easy
REFERENCES: 1-5b Computerized File Systems
LEARNING OBJECTIVES: 01.04 - See how modern databases evolved from file systems

45. Which of the following is true of spreadsheet applications?
a. They provide enhanced security and robust data sharing features.
b. They do not allow manipulation of data once entered.
c. They are a better alternative to databases.
d. They enhance the user's ability to understand the data.
ANSWER: d
DIFFICULTY: Moderate
REFERENCES: 1-5c File System Redux: Modern End-User Productivity
LEARNING OBJECTIVES: 01.04 - See how modern databases evolved from file systems

46. Which of the following refers to the situation where different versions of the same data are stored at different places because they weren't updated consistently?
a. Data query b. Data integrity
c. Data dictionary d. Data redundancy
ANSWER: d
DIFFICULTY: Easy
REFERENCES: 1-6b Data Redundancy
LEARNING OBJECTIVES: 01.05 - Understand flaws in file system data management

47. Data is said to be verifiable if:
a. the data always yields consistent results. b. the data cannot be changed or manipulated.
c. the data is obtained from trusted sources. d. the data is stored in different places within the database.
ANSWER: a

DIFFICULTY: Easy
REFERENCES: 1-6b Data Redundancy
LEARNING OBJECTIVES: 01.05 - Understand flaws in file system data management

48. _____ is defined as the condition in which all of the data in the database are consistent with the real-world events and conditions.

a. Data integrity b. Data anomaly
c. Data ubiquity d. Data quality

ANSWER: a
DIFFICULTY: Easy
REFERENCES: 1-6b Data Redundancy
LEARNING OBJECTIVES: 01.05 - Understand flaws in file system data management

49. The term _____ refers to an organization of components that define and regulate the collection, storage, management and use of data within a database environment.

a. structured data b. transaction
c. management system d. database system

ANSWER: d
DIFFICULTY: Moderate
REFERENCES: 1-7a The Database System Environment
LEARNING OBJECTIVES: 01.06 - Outline the main components of the database system

50. _____ relates to the activities that make the database execute transactions more efficiently in terms of storage and access speed.

a. Performance tuning b. Database design
c. Query access d. Database management

ANSWER: a
DIFFICULTY: Moderate
REFERENCES: 1-7b DBMS Functions
LEARNING OBJECTIVES: 01.06 - Outline the main components of the database system

Completion

51. _____ is the result of processing raw data to reveal its meaning.
ANSWER: Information
DIFFICULTY: Easy
REFERENCES: 1-2 Data versus Information
LEARNING OBJECTIVES: 01.01 - Define the difference between data and information

52. To reveal meaning, information requires _____.
ANSWER: context
DIFFICULTY: Easy
REFERENCES: 1-2 Data versus Information
LEARNING OBJECTIVES: 01.01 - Define the difference between data and information

53. Raw data must be properly _____ for storage, processing and presentation.

ANSWER: formatted
DIFFICULTY: Easy
REFERENCES: 1-2 Data versus Information
LEARNING OBJECTIVES: 01.01 - Define the difference between data and information

54. Information is produced by processing _____.
ANSWER: data
DIFFICULTY: Easy
REFERENCES: 1-2 Data versus Information
LEARNING OBJECTIVES: 01.01 - Define the difference between data and information

55. _____ is data about data through which the end-user data are integrated and managed.
ANSWER: Metadata
DIFFICULTY: Easy
REFERENCES: 1-3 Introducing the Database
LEARNING OBJECTIVES: 01.02 - Describe what a database is, the various types of databases, and why they are valuable assets for decision making

56. A(n) _____ is a collection of programs that manages the database structure and controls access to the data stored in the database.
ANSWER: DBMS (database management system)
database management system (DBMS)
database management system
DBMS
DIFFICULTY: Easy
REFERENCES: 1-3 Introducing the Database
LEARNING OBJECTIVES: 01.02 - Describe what a database is, the various types of databases, and why they are valuable assets for decision making

57. A(n) _____ is a spur-of-the-moment question.
ANSWER: ad hoc query
DIFFICULTY: Moderate
REFERENCES: 1-3a Role and Advantages of the DBMS
LEARNING OBJECTIVES: 01.02 - Describe what a database is, the various types of databases, and why they are valuable assets for decision making

58. A(n) _____ is a specific request issued to the DBMS for data manipulation.
ANSWER: query
DIFFICULTY: Easy
REFERENCES: 1-3a Role and Advantages of the DBMS
LEARNING OBJECTIVES: 01.02 - Describe what a database is, the various types of databases, and why they are valuable assets for decision making

59. _____ databases focus primarily on storing data used to generate information required to make tactical or strategic decisions.
ANSWER: Analytical
DIFFICULTY: Easy

REFERENCES: 1-3b Types of Databases
LEARNING OBJECTIVES: 01.02 - Describe what a database is, the various types of databases, and why they are valuable assets for decision making

60. _____ is a special language used to represent and manipulate data elements in a textual format.
ANSWER: XML (Extensible Markup Language)
Extensible Markup Language (XML)
Extensible Markup Language
XML
DIFFICULTY: Easy
REFERENCES: 1-3b Types of Databases
LEARNING OBJECTIVES: 01.02 - Describe what a database is, the various types of databases, and why they are valuable assets for decision making

61. _____ exists when it is possible to make changes in the data storage characteristics without affecting an application program's ability to access data.
ANSWER: Data independence
DIFFICULTY: Moderate
REFERENCES: 1-6a Structural and Data Dependence
LEARNING OBJECTIVES: 01.05 - Understand flaws in file system data management

62. The term _____ refers to scattered locations storing the same basic data.
ANSWER: islands of information
DIFFICULTY: Easy
REFERENCES: 1-6b Data Redundancy
LEARNING OBJECTIVES: 01.05 - Understand flaws in file system data management

63. _____ exists when different and conflicting versions of the same data appear in different places.
ANSWER: Data inconsistency
DIFFICULTY: Easy
REFERENCES: 1-6b Data Redundancy
LEARNING OBJECTIVES: 01.05 - Understand flaws in file system data management

64. _____ exists when the same data are stored unnecessarily at different places.
ANSWER: Data redundancy
DIFFICULTY: Easy
REFERENCES: 1-6b Data Redundancy
LEARNING OBJECTIVES: 01.05 - Understand flaws in file system data management

65. A(n) _____ develops when all required changes in the redundant data are not made successfully.
ANSWER: data anomaly
anomaly
DIFFICULTY: Easy
REFERENCES: 1-6c Data Anomalies
LEARNING OBJECTIVES: 01.05 - Understand flaws in file system data management

66. The DBMS uses the _____ to look up the required data component structures and relationships, thus relieving

programmers from having to code such complex relationships in each program.
ANSWER: data dictionary
DIFFICULTY: Easy
REFERENCES: 1-7b DBMS Functions
LEARNING OBJECTIVES: 01.06 - Outline the main components of the database system

67. _____ relates to activities that make a database operate more efficiently in terms of storage and access speed.
ANSWER: Performance tuning
DIFFICULTY: Easy
REFERENCES: 1-7b DBMS Functions
LEARNING OBJECTIVES: 01.06 - Outline the main components of the database system

68. Web and mobile technologies that enable "anywhere, anytime, always on" human interactions are forms of _____.
ANSWER: social media
DIFFICULTY: Easy
REFERENCES: 1-3b Types of Databases
LEARNING OBJECTIVES: 01.02 - Describe what a database is, the various types of databases, and why they are valuable assets for decision making

69. A database that is created and maintained using services such as Microsoft Azure or Amazon AWS is called a(n) _____ database.
ANSWER: cloud
DIFFICULTY: Easy
REFERENCES: 1-3b Types of Databases
LEARNING OBJECTIVES: 01.02 - Describe what a database is, the various types of databases, and why they are valuable assets for decision making

70. When a database stores the majority of data in RAM rather than in hard disks, it is referred to as a(n) _____ database.
ANSWER: in-memory
DIFFICULTY: Easy
REFERENCES: 1-8 Preparing for Your Database Professional
LEARNING OBJECTIVES: 01.07 - Describe the main functions of a database management system (DBMS)

Essay

71. Describe what metadata are and what value they provide to the database system.
ANSWER: The metadata describe the data characteristics and the set of relationships that links the data found within the database. For example, the metadata component stores information such as the name of each data element, the type of values (numeric, dates, or text) stored on each data element, and whether the data element can be left empty. The metadata provide information that complements and expands the value and use of the data. In short, metadata present a more complete picture of the data in the database. Given the characteristics of metadata, you might hear a database described as a "collection of self-describing data."
DIFFICULTY: Moderate
REFERENCES: 1-3 Introducing the Database
LEARNING OBJECTIVES: 01.02 - Describe what a database is, the various types of databases, and why they are valuable assets for decision making

72. What are the advantages of having the DBMS between the end user's applications and the database?

ANSWER: Having a DBMS between the end user's applications and the database offers some important advantages. First, the DBMS enables the data in the database to be shared among multiple applications or users. Second, the DBMS integrates the many different users' views of the data into a single all-encompassing data repository.

DIFFICULTY: Moderate

REFERENCES: 1-3a Role and Advantages of the DBMS

LEARNING OBJECTIVES: 01.02 - Describe what a database is, the various types of databases, and why they are valuable assets for decision making

73. Discuss some considerations when designing a database.

ANSWER: Proper database design requires the designer to identify precisely the database's expected use. Designing a transactional database emphasizes accurate and consistent data and operational speed. Designing a data warehouse database emphasizes the use of historical and aggregated data. Designing a database to be used in a centralized, single-user environment requires a different approach from that used in the design of a distributed, multiuser database.

Designing appropriate data repositories of integrated information using the two-dimensional table structures found in most databases is a process of decomposition. The integrated data must be decomposed properly into its constituent parts, with each part stored in its own table. Further, the relationships between these tables must be carefully considered and implemented so the integrated view of the data can be re-created later as information for the end user. A well-designed database facilitates data management and generates accurate and valuable information. A poorly designed database is likely to become a breeding ground for difficult-to-trace errors that may lead to bad decision making—and bad decision making can lead to the failure of an organization. Database design is simply too important to be left to luck. That's why college students study database design, why organizations of all types and sizes send personnel to database design seminars, and why database design consultants often make an excellent living.

DIFFICULTY: Moderate

REFERENCES: 1-4 Why Database Design Is Important

LEARNING OBJECTIVES: 01.03 - Explain the importance of database design

74. What are the problems associated with file systems? How do they challenge the types of information that can be created from the data as well as the accuracy of the information?

ANSWER:

The following problems associated with file systems, whether created by DP specialists or through a series of spread-sheets, severely challenge the types of information that can be created from the data as well as the accuracy of the information:

- *Lengthy development times.* The first and most glaring problem with the file system approach is that even the simplest data-retrieval task requires extensive programming. With the older file systems, programmers had to specify what must be done and how to do it.
- *Difficulty of getting quick answers.* The need to write programs to produce even the simplest reports makes ad hoc queries impossible. Harried DP specialists who worked with mature file systems often received numerous requests for new reports. They were often forced to say that the report will be ready "next week" or even "next month." If you need the information now, getting it next week or next month will not serve your information needs.
- *Complex system administration.* System administration becomes more difficult as the

number of files in the system expands. Even a simple file system with a few files requires creating and maintaining several file management programs. Each file must have its own file management programs that allow the user to add, modify, and delete records; to list the file contents; and to generate reports. Because ad hoc queries are not possible, the file reporting programs can multiply quickly. The problem is compounded by the fact that each department in the organization "owns" its data by creating its own files.

- *Lack of security and limited data sharing.* Another fault of a file system data repository is a lack of security and limited data sharing. Data sharing and security are closely related. Sharing data among multiple geographically dispersed users introduces a lot of security risks. In terms of spreadsheet data, while many spreadsheet programs provide rudimentary security options, they are not always used, and even when they are, they are insufficient for robust data sharing among users. In terms of creating data management and reporting programs, security and data-sharing features are difficult to program and consequently are often omitted from a file system environment. Such features include effective password protection, the ability to lock out parts of files or parts of the system itself, and other measures designed to safeguard data confidentiality. Even when an attempt is made to improve system and data security, the security devices tend to be limited in scope and effectiveness.
- *Extensive programming.* Making changes to an existing file structure can be difficult in a file system environment.

DIFFICULTY: Moderate
REFERENCES: 1-6 Problems with File System Data Processing
LEARNING OBJECTIVES: 01.05 - Understand flaws in file system data management

75. Discuss any three functions performed by the DBMS that guarantee the integrity and consistency of the data in the database.
ANSWER: (answers may vary)

- *Data dictionary management*. The DBMS stores definitions of the data elements and their relationships (metadata) in a data dictionary. In turn, all programs that access the data in the database work through the DBMS. The DBMS uses the data dictionary to look up the required data component structures and relationships, thus relieving you from having to code such complex relationships in each program. Additionally, any changes made in a database structure are automatically recorded in the data dictionary, thereby freeing you from having to modify all of the programs that access the changed structure. In other words, the DBMS provides data abstraction, and it removes structural and data dependence from the system.
- *Data storage management*. The DBMS creates and manages the complex structures required for data stor-age, thus relieving you from the difficult task of defining and programming the physical data characteristics. A modern DBMS provides storage not only for the data but for related data-entry forms or screen definitions, report definitions, data validation rules, procedural code, structures to handle video and picture formats, and so on. Data storage management is also important for database performance tuning. Performance tuning relates to the activities that make the database perform more efficiently in terms of storage and access speed. Although the user sees the database as a single data storage unit, the DBMS actually stores the database in multiple physical data files. Such data files may even be stored on different storage media. Therefore, the DBMS doesn't have to wait for one disk request to finish before the next one starts. In other words, the DBMS can fulfill database requests concurrently.

- *Data transformation and presentation*. The DBMS transforms entered data to conform to required data structures. The DBMS relieves you of the chore of distinguishing between the logical data format and the physical data format. That is, the DBMS formats the physically retrieved data to make it conform to the user's logical expectations.
- *Security management*. The DBMS creates a security system that enforces user security and data privacy. Security rules determine which users can access the database, which data items each user can access, and which data operations (read, add, delete, or modify) the user can perform. This is especially important in multiuser database systems.

DIFFICULTY: Moderate
REFERENCES: 1-7b DBMS Functions
LEARNING OBJECTIVES: 01.07 - Describe the main functions of a database management system (DBMS)

Chapter 02: Data Models

True / False

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

ANSWER: True
DIFFICULTY: Difficulty: Easy
REFERENCES: 2-1 Data Modeling and Data Models
LEARNING OBJECTIVES: 02.01 - Discuss data modeling and why data models are important

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
DIFFICULTY: Difficulty: Moderate
REFERENCES: 2-1 Data Modeling and Data Models
LEARNING OBJECTIVES: 02.01 - Discuss data modeling and why data models are important

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
DIFFICULTY: Difficulty: Easy
REFERENCES: 2-1 Data Modeling and Data Models
LEARNING OBJECTIVES: 02.01 - Discuss data modeling and why data models are important

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
DIFFICULTY: Difficulty: Easy
REFERENCES: 2-1 Data Modeling and Data Models
LEARNING OBJECTIVES: 02.01 - Discuss data modeling and why data models are important

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
DIFFICULTY: Difficulty: Moderate
REFERENCES: 2-2 The Importance of Data Models
LEARNING OBJECTIVES: 02.01 - Discuss data modeling and why data models are important

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
DIFFICULTY: Difficulty: Easy
REFERENCES: 2-3 Data Model Basic Building Blocks
LEARNING OBJECTIVES: 02.02 - Describe the basic data-modeling building blocks

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

ANSWER: False
DIFFICULTY: Difficulty: Easy
REFERENCES: 2-4 Business Rules
LEARNING OBJECTIVES: 02.03 - Define what business rules are and how they influence database design

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
DIFFICULTY: Difficulty: Moderate
REFERENCES: 2-4 Business Rules
LEARNING OBJECTIVES: 02.03 - Define what business rules are and how they influence database design

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

ANSWER: True
DIFFICULTY: Difficulty: Easy
REFERENCES: 2-4 Business Rules
LEARNING OBJECTIVES: 02.03 - Define what business rules are and how they influence database design

10. 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
DIFFICULTY: Difficulty: Moderate
REFERENCES: 2-5b The Relational Model
LEARNING OBJECTIVES: 02.04 - Understand how the major data models evolved

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

ANSWER: False
DIFFICULTY: Difficulty: Easy

REFERENCES: 2-5b The Relational Model
LEARNING OBJECTIVES: 02.04 - Understand how the major data models evolved

12. 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
DIFFICULTY: Difficulty: Easy
REFERENCES: 2-5b The Relational Model
LEARNING OBJECTIVES: 02.04 - Understand how the major data models evolved

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
DIFFICULTY: Difficulty: Easy
REFERENCES: 2-5c The Entity Relationship Model
LEARNING OBJECTIVES: 02.04 - Understand how the major data models evolved

14. M:N relationships are not appropriate in a relational model.
    a. True
    b. False
ANSWER: True
DIFFICULTY: Difficulty: Easy
REFERENCES: 2-5c The Entity Relationship Model
LEARNING OBJECTIVES: 02.04 - Understand how the major data models evolved

15. In Chen notation, entities and relationships have to be oriented horizontally; not vertically.
    a. True
    b. False
ANSWER: False
DIFFICULTY: Difficulty: Easy
REFERENCES: 2-5c The Entity Relationship Model
LEARNING OBJECTIVES: 02.04 - Understand how the major data models evolved

16. Today, most relational database products can be classified as object/relational.
    a. True
    b. False
ANSWER: True
DIFFICULTY: Difficulty: Easy
REFERENCES: 2-5e Object/Relational and XML
LEARNING OBJECTIVES: 02.04 - Understand how the major data models evolved

17. The network model has structural level dependence.

a. True
b. False

ANSWER: True
DIFFICULTY: Difficulty: Easy
REFERENCES: 2-5g Data Models: A Summary
LEARNING OBJECTIVES: 02.04 - Understand how the major data models evolved

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

ANSWER: False
DIFFICULTY: Difficulty: Easy
REFERENCES: 2-6a The External Model
LEARNING OBJECTIVES: 02.06 - Explain how data models can be classified by their level of abstraction

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

ANSWER: False
DIFFICULTY: Difficulty: Easy
REFERENCES: 2-6 Degrees of Data Abstraction
LEARNING OBJECTIVES: 02.06 - Explain how data models can be classified by their level of abstraction

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

ANSWER: False
DIFFICULTY: Difficulty: Easy
REFERENCES: 2-6 Degrees of Data Abstraction
LEARNING OBJECTIVES: 02.06 - Explain how data models can be classified by their level of abstraction

Multiple Choice

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
DIFFICULTY: Difficulty: Easy
REFERENCES: 2-1 Data Modeling and Data Models
LEARNING OBJECTIVES: 02.01 - Discuss data modeling and why data models are important

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

ANSWER: b

DIFFICULTY: Difficulty: Easy
REFERENCES: 2-3 Data Model Basic Building Blocks
LEARNING OBJECTIVES: 02.02 - Describe the basic data-modeling building blocks

23. A(n) _____ represents a particular type of object in the real world.
a. attribute b. entity
c. relationship d. node
ANSWER: b
DIFFICULTY: Difficulty: Easy
REFERENCES: 2-3 Data Model Basic Building Blocks
LEARNING OBJECTIVES: 02.02 - Describe the basic data-modeling building blocks

24. A(n) _____ is the equivalent of a field in a file system.
a. attribute b. entity
c. relationship d. constraint
ANSWER: a
DIFFICULTY: Difficulty: Easy
REFERENCES: 2-3 Data Model Basic Building Blocks
LEARNING OBJECTIVES: 02.02 - Describe the basic data-modeling building blocks

25. A(n) _____ is bidirectional.
a. attribute b. entity
c. relationship d. constraint
ANSWER: c
DIFFICULTY: Difficulty: Easy
REFERENCES: 2-3 Data Model Basic Building Blocks
LEARNING OBJECTIVES: 02.02 - Describe the basic data-modeling building blocks

26. A(n) _____ is a restriction placed on the data.
a. attribute b. entity
c. relationship d. constraint
ANSWER: d
DIFFICULTY: Difficulty: Easy
REFERENCES: 2-3 Data Model Basic Building Blocks
LEARNING OBJECTIVES: 02.02 - Describe the basic data-modeling building blocks

27. _____ are important because they help to ensure data integrity.
a. Attributes b. Entities
c. Relationships d. Constraints
ANSWER: d
DIFFICULTY: Difficulty: Easy
REFERENCES: 2-3 Data Model Basic Building Blocks
LEARNING OBJECTIVES: 02.02 - Describe the basic data-modeling building blocks

28. _____ are normally expressed in the form of rules.

a. Attributes b. Entities
c. Relationships d. Constraints

ANSWER: d
DIFFICULTY: Difficulty: Easy
REFERENCES: 2-3 Data Model Basic Building Blocks
LEARNING OBJECTIVES: 02.02 - Describe the basic data-modeling building blocks

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
DIFFICULTY: Difficulty: Easy
REFERENCES: 2-3 Data Model Basic Building Blocks
LEARNING OBJECTIVES: 02.02 - Describe the basic data-modeling building blocks

30. 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
DIFFICULTY: Difficulty: Moderate
REFERENCES: 2-4a Discovering Business Rules
LEARNING OBJECTIVES: 02.03 - Define what business rules are and how they influence database design

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

ANSWER: a
DIFFICULTY: Difficulty: Easy
REFERENCES: 2-4b Translating Business Rules into Data Model Components
LEARNING OBJECTIVES: 02.03 - Define what business rules are and how they influence database design

32. 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
DIFFICULTY: Difficulty: Easy
REFERENCES: 2-4b Translating Business Rules into Data Model Components
LEARNING OBJECTIVES: 02.03 - Define what business rules are and how they influence database design

33. 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

DIFFICULTY: Difficulty: Easy
REFERENCES: 2-5a Hierarchical and Network Models
LEARNING OBJECTIVES: 02.04 - Understand how the major data models evolved

34. 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
DIFFICULTY: Difficulty: Easy
REFERENCES: 2-5a Hierarchical and Network Models
LEARNING OBJECTIVES: 02.04 - Understand how the major data models evolved

35. The hierarchical data model was developed in the _____.
a. 1960s b. 1970s
c. 1980s d. 1990s
ANSWER: a
DIFFICULTY: Difficulty: Easy
REFERENCES: 2-5a Hierarchical and Network Models
LEARNING OBJECTIVES: 02.04 - Understand how the major data models evolved

36. 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
DIFFICULTY: Difficulty: Easy
REFERENCES: 2-5a Hierarchical and Network Models
LEARNING OBJECTIVES: 02.04 - Understand how the major data models evolved

37. The object-oriented data model was developed in the _____.
a. 1960s b. 1970s
c. 1980s d. 1990s
ANSWER: c
DIFFICULTY: Difficulty: Easy
REFERENCES: 2-5a Hierarchical and Network Models
LEARNING OBJECTIVES: 02.04 - Understand how the major data models evolved

38. 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
DIFFICULTY: Difficulty: Easy
REFERENCES: 2-5a Hierarchical and Network Models
LEARNING OBJECTIVES: 02.04 - Understand how the major data models evolved

39. Oracle 12c, MS SQL Server, and Tamino are examples of _____ data models.
a. hierarchical b. file system
c. relational d. XML Hybrid
ANSWER: d
DIFFICULTY: Difficulty: Easy
REFERENCES: 2-5a Hierarchical and Network Models
LEARNING OBJECTIVES: 02.04 - Understand how the major data models evolved

40. MySQL is an example of the _____.
a. hierarchical model b. file system data model
c. relational data model d. XML data model
ANSWER: c
DIFFICULTY: Difficulty: Easy
REFERENCES: 2-5b The Relational Model
LEARNING OBJECTIVES: 02.04 - Understand how the major data models evolved

41. 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
DIFFICULTY: Difficulty: Easy
REFERENCES: 2-5a Hierarchical and Network Models
LEARNING OBJECTIVES: 02.04 - Understand how the major data models evolved

42. The relational data model was developed in the _____.
a. 1960s b. 1970s
c. 1980s d. 1990s
ANSWER: b
DIFFICULTY: Difficulty: Easy
REFERENCES: 2-5b The Relational Model
LEARNING OBJECTIVES: 02.04 - Understand how the major data models evolved

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
DIFFICULTY: Difficulty: Easy
REFERENCES: 2-5c The Entity Relationship Model
LEARNING OBJECTIVES: 02.04 - Understand how the major data models evolved

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

DIFFICULTY: Difficulty: Easy
REFERENCES: 2-5a Hierarchical and Network Models
LEARNING OBJECTIVES: 02.04 - Understand how the major data models evolved

45. The _____ model uses the term connectivity to label the relationship types.
a. relational b. network
c. object-oriented d. entity relationship
ANSWER: d
DIFFICULTY: Difficulty: Easy
REFERENCES: 2-5c The Entity Relationship Model
LEARNING OBJECTIVES: 02.04 - Understand how the major data models evolved

46. The _____ data model is said to be a semantic data model.
a. relational b. network
c. object-oriented d. entity relationship
ANSWER: c
DIFFICULTY: Difficulty: Easy
REFERENCES: 2-5d The Object-Oriented Model
LEARNING OBJECTIVES: 02.04 - Understand how the major data models evolved

47. The _____ data model uses the concept of inheritance.
a. relational b. network
c. object-oriented d. entity relationship
ANSWER: c
DIFFICULTY: Difficulty: Easy
REFERENCES: 2-5d The Object-Oriented Model
LEARNING OBJECTIVES: 02.04 - Understand how the major data models evolved

48. 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
DIFFICULTY: Difficulty: Moderate
REFERENCES: 2-5f Emerging Data Models: Big Data and NoSQL
LEARNING OBJECTIVES: 02.05 - List emerging alternative data models and the needs they fulfill

49. 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
DIFFICULTY: Difficulty: Moderate
REFERENCES: 2-5f Emerging Data Models: Big Data and NoSQL
LEARNING OBJECTIVES: 02.05 - List emerging alternative data models and the needs they fulfill

50. 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
DIFFICULTY: Difficulty: Easy
REFERENCES: 2-5f Emerging Data Models: Big Data and NoSQL
LEARNING OBJECTIVES: 02.05 - List emerging alternative data models and the needs they fulfill

Completion

51. A(n) _____ is a relatively simple representation of more complex real-world data structures.
ANSWER: data model
DIFFICULTY: Difficulty: Easy
REFERENCES: 2-1 Data Modeling and Data Models
LEARNING OBJECTIVES: 02.01 - Discuss data modeling and why data models are important

52. A(n) _____ is a brief, precise, and unambiguous description of a policy, procedure, or principle within a specific organization.
ANSWER: business rule
DIFFICULTY: Difficulty: Easy
REFERENCES: 2-4 Business Rules
LEARNING OBJECTIVES: 02.03 - Define what business rules are and how they influence database design

53. A(n) _____ in a hierarchical model is the equivalent of a record in a file system.
ANSWER: segment
DIFFICULTY: Difficulty: Easy
REFERENCES: 2-5 The Evolution of Data Models
LEARNING OBJECTIVES: 02.04 - Understand how the major data models evolved

54. A(n) _____ is the conceptual organization of an entire database as viewed by a database administrator.
ANSWER: schema
DIFFICULTY: Difficulty: Easy
REFERENCES: 2-5a Hierarchical and Network Models
LEARNING OBJECTIVES: 02.04 - Understand how the major data models evolved

55. 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)
DIFFICULTY: Difficulty: Easy
REFERENCES: 2-5a Hierarchical and Network Models
LEARNING OBJECTIVES: 02.04 - Understand how the major data models evolved

56. The relational model's foundation is a mathematical concept known as a(n) _____.
ANSWER: relation
DIFFICULTY: Difficulty: Easy
REFERENCES: 2-5b The Relational Model
LEARNING OBJECTIVES: 02.04 - Understand how the major data models evolved

57. Each row in a relation is called a(n) _____.
ANSWER: tuple
DIFFICULTY: Difficulty: Easy
REFERENCES: 2-5b The Relational Model
LEARNING OBJECTIVES: 02.04 - Understand how the major data models evolved

58. Each column in a relation represents a(n) _____.
ANSWER: attribute
DIFFICULTY: Difficulty: Easy
REFERENCES: 2-5b The Relational Model
LEARNING OBJECTIVES: 02.04 - Understand how the major data models evolved

59. Each row in the relational table is known as a(n) _____.
ANSWER: entity instance
DIFFICULTY: Difficulty: Easy
REFERENCES: 2-5c The Entity Relationship Model
LEARNING OBJECTIVES: 02.04 - Understand how the major data models evolved

60. In _____, a three-pronged symbol represents the "many" side of the relationship.
ANSWER: Crow's Foot notation
DIFFICULTY: Difficulty: Easy
REFERENCES: 2-5c The Entity Relationship Model
LEARNING OBJECTIVES: 02.04 - Understand how the major data models evolved

61. A(n) _____ is a collection of similar objects with a shared structure and behavior.
ANSWER: class
DIFFICULTY: Difficulty: Easy
REFERENCES: 2-5d The Object-Oriented Model
LEARNING OBJECTIVES: 02.04 - Understand how the major data models evolved

62. In object-oriented terms, a(n) _____ defines an object's behavior.
ANSWER: method
DIFFICULTY: Difficulty: Easy
REFERENCES: 2-5d The Object-Oriented Model
LEARNING OBJECTIVES: 02.04 - Understand how the major data models evolved

63. _____ 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
DIFFICULTY: Difficulty: Easy
REFERENCES: 2-5d The Object-Oriented Model
LEARNING OBJECTIVES: 02.04 - Understand how the major data models evolved

64. 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
DIFFICULTY: Difficulty: Easy
REFERENCES: 2-6b The Conceptual Model
LEARNING OBJECTIVES: 02.06 - Explain how data models can be classified by their level of abstraction

65. The _____ is the representation of a database as "seen" by the DBMS.
ANSWER: internal model
DIFFICULTY: Difficulty: Easy
REFERENCES: 2-6c The Internal Model
LEARNING OBJECTIVES: 02.06 - Explain how data models can be classified by their level of abstraction

66. One of the limitations of the _____ model is that there is a lack of standards.
ANSWER: hierarchical
DIFFICULTY: Easy
REFERENCES: 2-5g Data Models: A Summary
LEARNING OBJECTIVES: 02.04 - Understand how the major data models evolved

67. The _____ model is the end users' view of the data environment.
ANSWER: external
DIFFICULTY: Easy
REFERENCES: 2-6a The External Model
LEARNING OBJECTIVES: 02.06 - Explain how data models can be classified by their level of abstraction

68. An internal _____ refers to a specific representation of an internal model, using the database constructs supported by the chosen database.
ANSWER: schema
DIFFICULTY: Easy
REFERENCES: 2-6c The Internal Model
LEARNING OBJECTIVES: 02.06 - Explain how data models can be classified by their level of abstraction

69. From a database point of view, the collection of data becomes meaningful only when it reflects properly defined _____.
ANSWER: business rules
DIFFICULTY: Moderate
REFERENCES: 2-4 Business Rules
LEARNING OBJECTIVES: 02.03 - Define what business rules are and how they influence database design

70. The movement to find new and better ways to manage large amounts of web- and sensor-generated data and derive business insight from it, while simultaneously providing high performance and scalability at a reasonable cost is referred to as "_____."
ANSWER: Big Data
DIFFICULTY: Easy
REFERENCES: 2-5f Emerging Data Models: Big Data and NoSQL
LEARNING OBJECTIVES: 02.05 - List emerging alternative data models and the needs they fulfill

Essay

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.

DIFFICULTY: Difficulty: Moderate

REFERENCES: 2-1 Data Modeling and Data Models

LEARNING OBJECTIVES: 02.01 - Discuss data modeling and why data models are important

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.

DIFFICULTY: Difficulty: Moderate

REFERENCES: 2-4 Business Rules

LEARNING OBJECTIVES: 02.03 - Define what business rules are and how they influence database design

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.

DIFFICULTY: Difficulty: Moderate

REFERENCES: 2-4a Discovering Business Rules

LEARNING OBJECTIVES: 02.03 - Define what business rules are and how they influence database design

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.

DIFFICULTY: Difficulty: Moderate
REFERENCES: 2-5b The Relational Model
LEARNING OBJECTIVES: 02.04 - Understand how the major data models evolved

75. Describe the three basic characteristics of Big Data databases.

ANSWER: Douglas Laney, a data analyst from the Gartner Group, first described the basic characteristics of Big Data databases4: volume, velocity, and variety, or the 3 Vs.

• *Volume* refers to the amounts of data being stored. With the adoption and growth of the Internet and social media, companies have multiplied the ways to reach customers. Over the years, and with the benefit of technological advances, data for millions of e-transactions were being stored daily on company databases. Furthermore, organizations are using multiple technologies to interact with end users
and those technologies are generating mountains of data. This ever-growing volume of data quickly reached petabytes in size, and it's still growing.
• *Velocity* refers not only to the speed with which data grows but also to the need to process this data quickly in order to generate information and insight. With the advent of the Internet and social media, business response times have shrunk considerably. Organizations need not only to store large volumes of quickly accumulating data but also need to process such data quickly. The velocity of data growth is also due to the increase in the number of different data streams from which data is being piped to the organization (via the web, e-commerce, Tweets, Facebook posts, emails, sensors, GPS, and so on).
• *Variety* refers to the fact that the data being collected comes in multiple different data formats. A great portion of these data comes in formats not suitable to be handled by the typical operational databases based on the relational model.

The 3 Vs framework illustrates what companies now know, that the amount of data being collected in their databases has been growing exponentially in size and complexity.

DIFFICULTY: Moderate
REFERENCES: 2-5f Emerging Data Models: Big Data and NoSQL
LEARNING OBJECTIVES: 02.05 - List emerging alternative data models and the needs they fulfill

Chapter 03: The Relational Database Model

True / False

1. The practical significance of taking the logical view of a database is that it serves as a reminder of the simple file concept of data storage.
   a. True
   b. False

ANSWER: True
DIFFICULTY: Difficulty: Moderate
REFERENCES: 3-1 A Logical View of Data
LEARNING OBJECTIVES: 03.01 - Describe the relational database model's logical structure

2. You can think of a table as a persistent representation of a logical relation.
   a. True
   b. False

ANSWER: True
DIFFICULTY: Difficulty: Easy
REFERENCES: 3-1a Tables and Their Characteristics
LEARNING OBJECTIVES: 03.02 - Identify the relational model's basic components and explain the structure, contents, and characteristics of a relational table

3. The order of the rows and columns is important to the DBMS.
   a. True
   b. False

ANSWER: False
DIFFICULTY: Difficulty: Moderate
REFERENCES: 3-1a Tables and Their Characteristics
LEARNING OBJECTIVES: 03.02 - Identify the relational model's basic components and explain the structure, contents, and characteristics of a relational table

4. Character data can contain any character or symbol intended for mathematical manipulation.
   a. True
   b. False

ANSWER: False
DIFFICULTY: Difficulty: Easy
REFERENCES: 3-1a Tables and Their Characteristics
LEARNING OBJECTIVES: 03.02 - Identify the relational model's basic components and explain the structure, contents, and characteristics of a relational table

5. Each table in a relational database must have a primary key.
   a. True
   b. False

ANSWER: True
DIFFICULTY: Difficulty: Easy
REFERENCES: 3-1a Tables and Their Characteristics
LEARNING OBJECTIVES: 03.02 - Identify the relational model's basic components and explain the structure, contents, and characteristics of a relational table

6. The row's range of permissible values is known as its domain.

a. True

b. False

ANSWER: False

DIFFICULTY: Difficulty: Easy

REFERENCES: 3-1a Tables and Their Characteristics

LEARNING OBJECTIVES: 03.02 - Identify the relational model's basic components and explain the structure, contents, and characteristics of a relational table

7. The idea of determination is unique to the database environment.

a. True

b. False

ANSWER: False

DIFFICULTY: Difficulty: Moderate

REFERENCES: 3-2a Dependencies

LEARNING OBJECTIVES: 03.02 - Identify the relational model's basic components and explain the structure, contents, and characteristics of a relational table

8. Only a single attribute, not multiple attributes, can define functional dependence.

a. True

b. False

ANSWER: False

DIFFICULTY: Difficulty: Easy

REFERENCES: 3-2a Dependencies

LEARNING OBJECTIVES: 03.02 - Identify the relational model's basic components and explain the structure, contents, and characteristics of a relational table

9. If the attribute (B) is functionally dependent on a composite key (A) but not on any subset of that composite key, the attribute (B) is fully functionally dependent on (A).

a. True

b. False

ANSWER: True

DIFFICULTY: Difficulty: Moderate

REFERENCES: 3-2a Dependencies

LEARNING OBJECTIVES: 03.02 - Identify the relational model's basic components and explain the structure, contents, and characteristics of a relational table

10. A null is created when you press the Enter key or the Tab key to move to the next entry without making a prior entry of any kind.

a. True

b. False

ANSWER: True

DIFFICULTY: Difficulty: Easy

REFERENCES: 3-2b Types of Keys

LEARNING OBJECTIVES: 03.02 - Identify the relational model's basic components and explain the structure, contents,

and characteristics of a relational table

11. Depending on the sophistication of the application development software, nulls can create problems when functions such as COUNT, AVERAGE, and SUM are used.

a. True

b. False

ANSWER: True

DIFFICULTY: Difficulty: Easy

REFERENCES: 3-2b Types of Keys

LEARNING OBJECTIVES: 03.02 - Identify the relational model's basic components and explain the structure, contents, and characteristics of a relational table

12. RDBMSs enforce integrity rules automatically.

a. True

b. False

ANSWER: True

DIFFICULTY: Difficulty: Easy

REFERENCES: 3-3 Integrity Rules

LEARNING OBJECTIVES: 03.02 - Identify the relational model's basic components and explain the structure, contents, and characteristics of a relational table

13. Relational algebra defines the theoretical way of manipulating table contents using relational operators.

a. True

b. False

ANSWER: True

DIFFICULTY: Difficulty: Easy

REFERENCES: 3-4 Relational Algebra

LEARNING OBJECTIVES: 03.03 - Use relational database operators to manipulate relational table contents

14. The SELECT operator yields a vertical subset of a table.

a. True

b. False

ANSWER: False

DIFFICULTY: Difficulty: Easy

REFERENCES: 3-4b Relational Set Operators

LEARNING OBJECTIVES: 03.03 - Use relational database operators to manipulate relational table contents

15. The DIFFERENCE operator subtracts one table from the other.

a. True

b. False

ANSWER: True

DIFFICULTY: Difficulty: Easy

REFERENCES: 3-4b Relational Set Operators

LEARNING OBJECTIVES: 03.03 - Use relational database operators to manipulate relational table contents

16. In a natural join, the column on which the join was made occurs twice in the new table.

a. True
b. False

ANSWER: False
DIFFICULTY: Difficulty: Easy
REFERENCES: 3-4b Relational Set Operators
LEARNING OBJECTIVES: 03.03 - Use relational database operators to manipulate relational table contents

17. The DIVIDE operation uses one single-column table (e.g., column "a") as the divisor and one two-column table (e.g., columns "a" and "b") as the dividend.

a. True
b. False

ANSWER: True
DIFFICULTY: Difficulty: Easy
REFERENCES: 3-4b Relational Set Operators
LEARNING OBJECTIVES: 03.03 - Use relational database operators to manipulate relational table contents

18. A data dictionary is sometimes described as "the database designer's database" because it records the design decisions about tables and their structures.

a. True
b. False

ANSWER: True
DIFFICULTY: Difficulty: Easy
REFERENCES: 3-5 The Data Dictionary and the System Catalog
LEARNING OBJECTIVES: 03.04 - Explain the purpose and components of the data dictionary and system catalog

19. The one-to-many (1:M) relationship is easily implemented in the relational model by putting the foreign key of the "1" side in the table of the "many" side as a primary key.

a. True
b. False

ANSWER: False
DIFFICULTY: Difficulty: Moderate
REFERENCES: 3-6a The 1:M Relationship
LEARNING OBJECTIVES: 03.05 - Identify appropriate entities and then the relationships among the entities in the relational database model

20. As rare as 1:1 relationships should be, certain conditions absolutely require their use.

a. True
b. False

ANSWER: True
DIFFICULTY: Difficulty: Easy
REFERENCES: 3-6b The 1:1 Relationship
LEARNING OBJECTIVES: 03.05 - Identify appropriate entities and then the relationships among the entities in the relational database model

Multiple Choice

21. _____ logic, used extensively in mathematics, provides a framework in which an assertion (statement of fact) can be verified as either true or false.

a. Predicate b. Database

c. Relational d. Index

ANSWER: a

DIFFICULTY: Difficulty: Easy

REFERENCES: 3-1 A Logical View of Data

LEARNING OBJECTIVES: 03.01 - Describe the relational database model's logical structure

22. Each table _____ represents an attribute.

a. column b. row

c. dimension d. value

ANSWER: a

DIFFICULTY: Difficulty: Easy

REFERENCES: 3-1a Tables and Their Characteristics

LEARNING OBJECTIVES: 03.02 - Identify the relational model's basic components and explain the structure, contents, and characteristics of a relational table

23. Date attributes contain calendar dates stored in a special format known as the _____ date format.

a. Epoch b. calendar

c. Julian d. logical

ANSWER: c

DIFFICULTY: Difficulty: Easy

REFERENCES: 3-1a Tables and Their Characteristics

LEARNING OBJECTIVES: 03.02 - Identify the relational model's basic components and explain the structure, contents, and characteristics of a relational table

24. In the relational model, _____ are important because they are used to ensure that each row in a table is uniquely identifiable.

a. relations b. keys

c. indexes d. logical structures

ANSWER: b

DIFFICULTY: Difficulty: Easy

REFERENCES: 3-2 Keys

LEARNING OBJECTIVES: 03.02 - Identify the relational model's basic components and explain the structure, contents, and characteristics of a relational table

25. A _____ is any key that uniquely identifies each row.

a. superkey b. special key

c. foreign key d. candidate key

ANSWER: a

DIFFICULTY: Difficulty: Easy

REFERENCES: 3-2b Types of Keys

LEARNING OBJECTIVES: 03.02 - Identify the relational model's basic components and explain the structure, contents, and characteristics of a relational table

26. A _____ key can be described as a minimal superkey, a superkey without any unnecessary attributes.

a. secondary b. candidate

c. primary d. foreign

ANSWER: b

DIFFICULTY: Difficulty: Easy

REFERENCES: 3-2b Types of Keys

LEARNING OBJECTIVES: 03.02 - Identify the relational model's basic components and explain the structure, contents, and characteristics of a relational table

27. A _____ is the primary key of one table that has been placed into another table to create a common attribute.

a. superkey b. composite primary key

c. candidate key d. foreign key

ANSWER: d

DIFFICULTY: Difficulty: Easy

REFERENCES: 3-2b Types of Keys

LEARNING OBJECTIVES: 03.02 - Identify the relational model's basic components and explain the structure, contents, and characteristics of a relational table

28. A _____ key is defined as a key that is used strictly for data retrieval purposes.

a. lookup b. foreign

c. candidate d. secondary

ANSWER: d

DIFFICULTY: Difficulty: Easy

REFERENCES: 3-2b Types of Keys

LEARNING OBJECTIVES: 03.02 - Identify the relational model's basic components and explain the structure, contents, and characteristics of a relational table

29. Referential _____ dictates that the foreign key must contain values that match the primary key in the related table, or must contain null.

a. integrity b. uniqueness

c. model d. attribute

ANSWER: a

DIFFICULTY: Difficulty: Easy

REFERENCES: 3-3 Integrity Rules

LEARNING OBJECTIVES: 03.02 - Identify the relational model's basic components and explain the structure, contents, and characteristics of a relational table

30. The CUSTOMER table's primary key is CUS_CODE. The CUSTOMER primary key column has no null entries, and all entries are unique. This is an example of _____ integrity.

a. entity b. referential

c. relational d. null

ANSWER: a

DIFFICULTY: Difficulty: Moderate

REFERENCES: 3-3 Integrity Rules

LEARNING OBJECTIVES: 03.02 - Identify the relational model's basic components and explain the structure, contents, and characteristics of a relational table

31. The _____ constraint can be placed on a column to ensure that every row in the table has a value for that column.
a. UNIQUE b. NOT NULL
c. VALUE d. EMPTY
ANSWER: b
DIFFICULTY: Difficulty: Easy
REFERENCES: 3-3 Integrity Rules
LEARNING OBJECTIVES: 03.02 - Identify the relational model's basic components and explain the structure, contents, and characteristics of a relational table

32. To be considered minimally relational, the DBMS must support the key relational operators _____, PROJECT, and JOIN.
a. INTERSECT b. UNION
c. DIFFERENCE d. SELECT
ANSWER: d
DIFFICULTY: Difficulty: Easy
REFERENCES: 3-4 Relational Algebra
LEARNING OBJECTIVES: 03.03 - Use relational database operators to manipulate relational table contents

33. _____, also known as RESTRICT, yields values for all rows found in a table that satisfy a given condition.
a. INTERSECT b. UNION
c. DIFFERENCE d. SELECT
ANSWER: d
DIFFICULTY: Difficulty: Easy
REFERENCES: 3-4b Relational Set Operators
LEARNING OBJECTIVES: 03.03 - Use relational database operators to manipulate relational table contents

34. _____ returns only the attributes requested, in the order in which they are requested.
a. PROJECT b. SELECT
c. UNION d. DIFFERENCE
ANSWER: a
DIFFICULTY: Difficulty: Easy
REFERENCES: 3-4b Relational Set Operators
LEARNING OBJECTIVES: 03.03 - Use relational database operators to manipulate relational table contents

35. When two or more tables share the same number of columns, and when their corresponding columns share the same or compatible domains, they are said to be _____.
a. intersect-compatible b. union-compatible
c. difference-compatible d. select-compatible
ANSWER: b
DIFFICULTY: Difficulty: Easy
REFERENCES: 3-4b Relational Set Operators
LEARNING OBJECTIVES: 03.03 - Use relational database operators to manipulate relational table contents

36. A(n) _____ join links tables by selecting only the rows with common values in their common attribute(s).
a. attribute b. unique

c. foreign d. natural
ANSWER: d
DIFFICULTY: Difficulty: Easy
REFERENCES: 3-4b Relational Set Operators
LEARNING OBJECTIVES: 03.03 - Use relational database operators to manipulate relational table contents

37. _____ are especially useful when you are trying to determine what values in related tables cause referential integrity problems.
a. Inner joins b. Outer joins
c. Equijoins d. Theta joins
ANSWER: b
DIFFICULTY: Difficulty: Easy
REFERENCES: 3-4b Relational Set Operators
LEARNING OBJECTIVES: 03.03 - Use relational database operators to manipulate relational table contents

38. A(n) _____ only returns matched records from the tables that are being joined.
a. outer join b. inner join
c. equijoin d. theta join
ANSWER: b
DIFFICULTY: Difficulty: Easy
REFERENCES: 3-4b Relational Set Operators
LEARNING OBJECTIVES: 03.03 - Use relational database operators to manipulate relational table contents

39. A _____ contains at least all of the attribute names and characteristics for each table in the system.
a. data dictionary b. relational schema
c. logical schema d. database
ANSWER: a
DIFFICULTY: Difficulty: Easy
REFERENCES: 3-5 The Data Dictionary and the System Catalog
LEARNING OBJECTIVES: 03.04 - Explain the purpose and components of the data dictionary and system catalog

40. The _____ is actually a system-created database whose tables store the user/designer-created database characteristics and contents.
a. database tuple b. systematic database
c. unique index d. system catalog
ANSWER: d
DIFFICULTY: Difficulty: Easy
REFERENCES: 3-5 The Data Dictionary and the System Catalog
LEARNING OBJECTIVES: 03.04 - Explain the purpose and components of the data dictionary and system catalog

41. In a database context, the word _____ indicates the use of the same attribute name to label different attributes.
a. redundancy b. homonym
c. duplicate d. synonym
ANSWER: b
DIFFICULTY: Difficulty: Moderate

REFERENCES: 3-5 The Data Dictionary and the System Catalog
LEARNING OBJECTIVES: 03.04 - Explain the purpose and components of the data dictionary and system catalog

42. In a database context, a(n) _____ indicates the use of different names to describe the same attribute.
a. entity b. duplicate
c. synonym d. homonym
ANSWER: c
DIFFICULTY: Difficulty: Easy
REFERENCES: 3-5 The Data Dictionary and the System Catalog
LEARNING OBJECTIVES: 03.04 - Explain the purpose and components of the data dictionary and system catalog

43. The _____ relationship is the "relational model ideal."
a. 1:1 b. 1:M
c. M:1 d. M:N
ANSWER: b
DIFFICULTY: Difficulty: Easy
REFERENCES: 3-6 Relationships within the Relational Database
LEARNING OBJECTIVES: 03.05 - Identify appropriate entities and then the relationships among the entities in the relational database model

44. The _____ relationship should be rare in any relational database design.
a. 1:1 b. 1:M
c. M:1 d. M:N
ANSWER: a
DIFFICULTY: Difficulty: Easy
REFERENCES: 3-6 Relationships within the Relational Database
LEARNING OBJECTIVES: 03.05 - Identify appropriate entities and then the relationships among the entities in the relational database model

45. _____ relationships can be implemented by creating a new entity in 1:M relationships with the original entities.
a. 1:N b. M:1
c. M:N d. 1:1
ANSWER: c
DIFFICULTY: Difficulty: Easy
REFERENCES: 3-6c The M:N Relationship
LEARNING OBJECTIVES: 03.05 - Identify appropriate entities and then the relationships among the entities in the relational database model

46. Another name for a composite entity is a(n) _____ entity.
a. bridge b. linked
c. directive d. associative
ANSWER: a
DIFFICULTY: Difficulty: Easy
REFERENCES: 3-6c The M:N Relationship
LEARNING OBJECTIVES: 03.05 - Identify appropriate entities and then the relationships among the entities in the relational database model

47. A(n) _____ is an orderly arrangement used to logically access rows in a table.

a. primary rule b. superkey
c. relationship d. index

ANSWER: d
DIFFICULTY: Difficulty: Easy
REFERENCES: 3-8 Indexes
LEARNING OBJECTIVES: 03.07 - Explain the purpose of indexing in a relational database

48. When you define a table's primary key, the DBMS automatically creates a(n) _____ index on the primary key column(s) you declared.

a. key b. composite
c. unique d. primary

ANSWER: c
DIFFICULTY: Difficulty: Easy
REFERENCES: 3-8 Indexes
LEARNING OBJECTIVES: 03.07 - Explain the purpose of indexing in a relational database

49. According to Codd's _____ rule of relational databases, application programs and ad hoc facilities are logically unaffected when changes are made to the table structures that preserve the original table values (changing order of columns or inserting columns).

a. distribution independence b. logical data independence
c. comprehensive data sublanguage d. integrity independence

ANSWER: b
DIFFICULTY: Difficulty: Moderate
REFERENCES: 3-9 Codd's Relational Database Rules
LEARNING OBJECTIVES: 03.02 - Identify the relational model's basic components and explain the structure, contents, and characteristics of a relational table

50. According to Codd's _____ rule of relational databases, if the system supports low-level access to the data, users must not be allowed to bypass the integrity rules of the database.

a. nonsubversion b. information
c. guaranteed access d. view updating

ANSWER: a
DIFFICULTY: Difficulty: Moderate
REFERENCES: 3-9 Codd's Relational Database Rules
LEARNING OBJECTIVES: 03.02 - Identify the relational model's basic components and explain the structure, contents, and characteristics of a relational table

Completion

51. A table is also called a(n) _____ because the relational model's creator, E. F. Codd, used the two terms as synonyms.

ANSWER: relation
DIFFICULTY: Difficulty: Easy
REFERENCES: 3-1a Tables and Their Characteristics
LEARNING OBJECTIVES: 03.02 - Identify the relational model's basic components and explain the structure, contents,

and characteristics of a relational table

52. In a relational table, each column has a specific range of values known as the _____ domain.
ANSWER: attribute
DIFFICULTY: Difficulty: Easy
REFERENCES: 3-1a Tables and Their Characteristics
LEARNING OBJECTIVES: 03.02 - Identify the relational model's basic components and explain the structure, contents, and characteristics of a relational table

53. A primary key is a(n) _____ key chosen to be the primary means by which rows of a table are uniquely identified.
ANSWER: candidate
DIFFICULTY: Difficulty: Easy
REFERENCES: 3-1a Tables and Their Characteristics
LEARNING OBJECTIVES: 03.02 - Identify the relational model's basic components and explain the structure, contents, and characteristics of a relational table

54. In a relational model, _____ are used to establish relationships among tables and to ensure the integrity of the data.
ANSWER: keys
DIFFICULTY: Difficulty: Easy
REFERENCES: 3-2 Keys
LEARNING OBJECTIVES: 03.02 - Identify the relational model's basic components and explain the structure, contents, and characteristics of a relational table

55. To avoid nulls, some designers use special codes, known as _____, to indicate the absence of some value.
ANSWER: flags
DIFFICULTY: Difficulty: Easy
REFERENCES: 3-3 Integrity Rules
LEARNING OBJECTIVES: 03.02 - Identify the relational model's basic components and explain the structure, contents, and characteristics of a relational table

56. The relational operators have the property of _____; that is, the use of relational algebra operators on existing relations (tables) produces new relations.
ANSWER: closure
DIFFICULTY: Difficulty: Easy
REFERENCES: 3-4b Relational Set Operators
LEARNING OBJECTIVES: 03.03 - Use relational database operators to manipulate relational table contents

57. PRODUCT yields all possible pairs of rows from two tables, also known as the _____ product.
ANSWER: Cartesian
DIFFICULTY: Difficulty: Moderate
REFERENCES: 3-4b Relational Set Operators
LEARNING OBJECTIVES: 03.03 - Use relational database operators to manipulate relational table contents

58. _____ is the real power behind the relational database, allowing the use of independent tables linked by common attributes.
ANSWER: JOIN
DIFFICULTY: Difficulty: Easy

REFERENCES: 3-4b Relational Set Operators
LEARNING OBJECTIVES: 03.03 - Use relational database operators to manipulate relational table contents

59. A(n) _____ links tables on the basis of an equality condition that compares specified columns of each table.
ANSWER: equijoin
DIFFICULTY: Difficulty: Easy
REFERENCES: 3-4b Relational Set Operators
LEARNING OBJECTIVES: 03.03 - Use relational database operators to manipulate relational table contents

60. A(n) _____ provides a detailed description of all tables found within the user/designer-created database.
ANSWER: data dictionary
DIFFICULTY: Difficulty: Easy
REFERENCES: 3-5 The Data Dictionary and the System Catalog
LEARNING OBJECTIVES: 03.04 - Explain the purpose and components of the data dictionary and system catalog

61. The _____ catalog can be described as a detailed system data dictionary that describes all objects within the database, including data about table names, the table's creator and creation date, the number of columns in each table, the data type corresponding to each column, index filenames, index creators, authorized users, and access privileges.
ANSWER: system
DIFFICULTY: Difficulty: Easy
REFERENCES: 3-5 The Data Dictionary and the System Catalog
LEARNING OBJECTIVES: 03.04 - Explain the purpose and components of the data dictionary and system catalog

62. The _____ relationship is the relational database norm.
ANSWER: 1:M
DIFFICULTY: Difficulty: Moderate
REFERENCES: 3-6a The 1:M Relationship
LEARNING OBJECTIVES: 03.05 - Identify appropriate entities and then the relationships among the entities in the relational database model

63. _____ relationships cannot be implemented as such in the relational model.
ANSWER: M:N
DIFFICULTY: Difficulty: Moderate
REFERENCES: 3-6c The M:N Relationship
LEARNING OBJECTIVES: 03.05 - Identify appropriate entities and then the relationships among the entities in the relational database model

64. If one department chair—a professor—can chair only one department, and one department can have only one department chair. The entities PROFESSOR and DEPARTMENT exhibit a(n) _____ relationship.
ANSWER: 1:1
DIFFICULTY: Difficulty: Moderate
REFERENCES: 3-6b The 1:1 Relationship
LEARNING OBJECTIVES: 03.05 - Identify appropriate entities and then the relationships among the entities in the relational database model

65. One characteristic of generalization hierarchies is that they are implemented as _____ relationships.
ANSWER: 1:1

DIFFICULTY: Difficulty: Moderate
REFERENCES: 3-6b The 1:1 Relationship
LEARNING OBJECTIVES: 03.05 - Identify appropriate entities and then the relationships among the entities in the relational database model

66. The proper use of _____ keys is crucial to controlling data redundancy.
ANSWER: foreign
DIFFICULTY: Difficulty: Easy
REFERENCES: 3-7 Data Redundancy Revisited
LEARNING OBJECTIVES: 03.06 - Describe how data redundancy is handled in the relational database model

67. Proper data _____ design requires carefully defined and controlled data redundancies to function properly.
ANSWER: warehousing
DIFFICULTY: Difficulty: Easy
REFERENCES: 3-7 Data Redundancy Revisited
LEARNING OBJECTIVES: 03.06 - Describe how data redundancy is handled in the relational database model

68. A(n) _____ index is an index in which the index key can have only one pointer value (row) associated with it.
ANSWER: unique
DIFFICULTY: Difficulty: Easy
REFERENCES: 3-8 Indexes
LEARNING OBJECTIVES: 03.07 - Explain the purpose of indexing in a relational database

69. An index key can have multiple _____ (a composite index).
ANSWER: attributes
DIFFICULTY: Difficulty: Easy
REFERENCES: 3-8 Indexes
LEARNING OBJECTIVES: 03.07 - Explain the purpose of indexing in a relational database

70. Dr. Codd's _____ rule of relational database states that every value in a table is guaranteed to be accessible through a combination of table name, primary key value, and column name.
ANSWER: guaranteed Access
DIFFICULTY: Difficulty: Moderate
REFERENCES: 3-9 Codd's Relational Database Rules
LEARNING OBJECTIVES: 03.02 - Identify the relational model's basic components and explain the structure, contents, and characteristics of a relational table

Essay

71. What is a key and how is it important in a relational model?
ANSWER: In a relational model, keys are important because they are used to ensure that each row in a table is uniquely identifiable. They are also used to establish relationships among tables and to ensure the integrity of the data. A key consists of one or more attributes that determine other attributes. For example, an invoice number identifies all of the invoice attributes, such as the invoice date and the customer name.
DIFFICULTY: Difficulty: Moderate
REFERENCES: 3-2 Keys

LEARNING OBJECTIVES: 03.02 - Identify the relational model's basic components and explain the structure, contents, and characteristics of a relational table

72. Define entity integrity. What are the two requirements to ensure entity integrity?

ANSWER: Entity integrity is the condition in which each row (entity instance) in the table has its own unique identity. To ensure entity integrity, the primary key has two requirements:
(1) all of the values in the primary key must be unique.
(2) no key attribute in the primary key can contain a null.

DIFFICULTY: Difficulty: Moderate

REFERENCES: 3-2b Types of Keys

LEARNING OBJECTIVES: 03.02 - Identify the relational model's basic components and explain the structure, contents, and characteristics of a relational table

73. Describe the use of null values in a database.

ANSWER: Null values are problematic in a relational model. A null is the absence of any data value, and it is never allowed in any part of the primary key. From a theoretical perspective, it can be argued that a table that contains a null is not properly a relational table at all. From a practical perspective, however, some nulls cannot be reasonably avoided. For example, not all students have a middle initial. As a general rule, nulls should be avoided as much as reasonably possible. In fact, an abundance of nulls is often a sign of a poor design. Also, nulls should be avoided in the database because their meaning is not always identifiable. For example, a null could represent:
• An unknown attribute value.
• A known, but missing, attribute value.
• A "not applicable" condition.

DIFFICULTY: Difficulty: Moderate

REFERENCES: 3-2b Types of Keys

LEARNING OBJECTIVES: 03.02 - Identify the relational model's basic components and explain the structure, contents, and characteristics of a relational table

74. Describe the use of the INTERSECT operator.

ANSWER: INTERSECT yields only the rows that appear in both tables. As with UNION, the tables must be union-compatible to yield valid results. For example, you cannot use INTERSECT if one of the attributes is numeric and one is character-based. For the rows to be considered the same in both tables and appear in the result of the INTERSECT, the entire rows must be exact duplicates.

DIFFICULTY: Difficulty: Moderate

REFERENCES: 3-4b Relational Set Operators

LEARNING OBJECTIVES: 03.03 - Use relational database operators to manipulate relational table contents

75. Define an index. Explain the role of indexes in a relational database.

ANSWER: An index is an orderly arrangement used to logically access rows in a table. From a conceptual point of view, an index is composed of an index key and a set of pointers. The index key is, in effect, the index's reference point. More formally, an index is an ordered arrangement of keys and pointers. Each key points to the location of the data identified by the key. DBMSs use indexes for many different purposes. An index can be used to retrieve data more efficiently. Indexes can also be used by a DBMS to retrieve data ordered by a specific attribute or attributes. For example, creating an index on a customer's last name will allow you to retrieve the customer data alphabetically by the customer's last name.
Also, an index key can be composed of one or more attributes. Indexes play an important role

in DBMSs for the implementation of primary keys. When you define a table's primary key, the DBMS automatically creates a unique index on the primary key column(s) you declared.

DIFFICULTY: Difficulty: Moderate

REFERENCES: 3-8 Indexes

LEARNING OBJECTIVES: 03.07 - Explain the purpose of indexing in a relational database

Chapter 04: Entity Relationship (ER) Modeling

True / False

1. The entity relationship model (ERM) is dependent on the database type.
   a. True
   b. False

ANSWER: False
DIFFICULTY: Difficulty: Easy
REFERENCES: 4-1 The Entity Relationship Model
LEARNING OBJECTIVES: 04.01 - Identify the main characteristics of entity relationship components

2. The Crow's Foot notation is less implementation-oriented than the Chen notation.
   a. True
   b. False

ANSWER: False
DIFFICULTY: Difficulty: Moderate
REFERENCES: 4-1 The Entity Relationship Model
LEARNING OBJECTIVES: 04.01 - Identify the main characteristics of entity relationship components

3. An entity in the entity relationship model corresponds to a table in the relational environment.
   a. True
   b. False

ANSWER: True
DIFFICULTY: Difficulty: Easy
REFERENCES: 4-1a Entities
LEARNING OBJECTIVES: 04.01 - Identify the main characteristics of entity relationship components

4. In the entity relationship model, a table row corresponds to an entity instance.
   a. True
   b. False

ANSWER: True
DIFFICULTY: Difficulty: Easy
REFERENCES: 4-1a Entities
LEARNING OBJECTIVES: 04.01 - Identify the main characteristics of entity relationship components

5. In the Chen and Crow's Foot notations, an entity is represented with a rectangle containing the entity's name.
   a. True
   b. False

ANSWER: True
DIFFICULTY: Difficulty: Easy
REFERENCES: 4-1a Entities
LEARNING OBJECTIVES: 04.01 - Identify the main characteristics of entity relationship components

6. In the original Chen notation, each attribute is represented by an oval with the attribute name connected to an entity rectangle with a line.
   a. True

b. False

ANSWER: True
DIFFICULTY: Difficulty: Easy
REFERENCES: 4-1b Attributes
LEARNING OBJECTIVES: 04.01 - Identify the main characteristics of entity relationship components

7. Software vendors have adopted the Chen representation because of its compact representation.
a. True
b. False

ANSWER: False
DIFFICULTY: Difficulty: Moderate
REFERENCES: 4-1b Attributes
LEARNING OBJECTIVES: 04.01 - Identify the main characteristics of entity relationship components

8. A composite identifier is a primary key composed of more than one attribute.
a. True
b. False

ANSWER: True
DIFFICULTY: Difficulty: Easy
REFERENCES: 4-1b Attributes
LEARNING OBJECTIVES: 04.01 - Identify the main characteristics of entity relationship components

9. The Crow's Foot notation easily identifies multivalued attributes.
a. True
b. False

ANSWER: False
DIFFICULTY: Difficulty: Easy
REFERENCES: 4-1b Attributes
LEARNING OBJECTIVES: 04.01 - Identify the main characteristics of entity relationship components

10. Composite attributes make it easier to facilitate detailed queries.
a. True
b. False

ANSWER: False
DIFFICULTY: Difficulty: Easy
REFERENCES: 4-1b Attributes
LEARNING OBJECTIVES: 04.01 - Identify the main characteristics of entity relationship components

11. Connectivities and cardinalities are established by concise statements known as business rules.
a. True
b. False

ANSWER: True
DIFFICULTY: Difficulty: Easy
REFERENCES: 4-1d Connectivity and Cardinality
LEARNING OBJECTIVES: 04.02 - Describe how relationships between entities are defined, refined, and incorporated

into the database design process

12. In Chen notation, there is no way to represent cardinality.
    a. True
    b. False

ANSWER: False
DIFFICULTY: Difficulty: Easy
REFERENCES: 4-1d Connectivity and Cardinality
LEARNING OBJECTIVES: 04.02 - Describe how relationships between entities are defined, refined, and incorporated into the database design process

13. In implementation terms, an entity is existence-dependent if it has a mandatory primary key.
    a. True
    b. False

ANSWER: False
DIFFICULTY: Difficulty: Easy
REFERENCES: 4-1e Existence Dependence
LEARNING OBJECTIVES: 04.03 - See how ERD components affect database design and implementation

14. A weak relationship exists if the primary key of the related entity contains at least one primary key component of the parent entity.
    a. True
    b. False

ANSWER: False
DIFFICULTY: Difficulty: Easy
REFERENCES: 4-1f Relationship Strength
LEARNING OBJECTIVES: 04.03 - See how ERD components affect database design and implementation

15. A weak entity has a primary key that is partially or totally derived from the parent entity in the relationship.
    a. True
    b. False

ANSWER: True
DIFFICULTY: Difficulty: Easy
REFERENCES: 4-1g Weak Entities
LEARNING OBJECTIVES: 04.03 - See how ERD components affect database design and implementation

16. In a 1:M relationship, to avoid the possibility of referential integrity errors, the data of the "1" side must be loaded first.
    a. True
    b. False

ANSWER: True
DIFFICULTY: Difficulty: Moderate
REFERENCES: 4-1f Relationship Strength
LEARNING OBJECTIVES: 04.03 - See how ERD components affect database design and implementation

17. Relationships between entities always operate in one direction.

a. True
b. False

ANSWER: False
DIFFICULTY: Difficulty: Easy
REFERENCES: 4-1h Relationship Participation
LEARNING OBJECTIVES: 04.03 - See how ERD components affect database design and implementation

18. The existence of a mandatory relationship indicates that the minimum cardinality is 0 or 1 for the mandatory entity.
a. True
b. False

ANSWER: False
DIFFICULTY: Difficulty: Easy
REFERENCES: 4-1h Relationship Participation
LEARNING OBJECTIVES: 04.03 - See how ERD components affect database design and implementation

19. Referential integrity and participation are both bidirectional, meaning that they must be addressed in both directions along a relationship.
a. True
b. False

ANSWER: False
DIFFICULTY: Difficulty: Easy
REFERENCES: 4-1j Recursive Relationships
LEARNING OBJECTIVES: 04.03 - See how ERD components affect database design and implementation

20. To implement a small database, a database designer must know the "1" and the "M" sides of each relationship and whether the relationships are mandatory or optional.
a. True
b. False

ANSWER: True
DIFFICULTY: Difficulty: Moderate
REFERENCES: 4-1k Associative (Composite) Entities
LEARNING OBJECTIVES: 04.03 - See how ERD components affect database design and implementation

Multiple Choice

21. The entity relationship diagram (ERD) represents the _____ database as viewed by the end user.
a. condensed b. physical
c. logical d. conceptual

ANSWER: d
DIFFICULTY: Difficulty: Easy
REFERENCES: 4-1 The Entity Relationship Model
LEARNING OBJECTIVES: 04.01 - Identify the main characteristics of entity relationship components

22. The _____ notation of entity-relationship modelling can be used for both conceptual and implementation modelling.
a. Bachman b. UML

c. Chen d. Crow's Foot
ANSWER: b
DIFFICULTY: Difficulty: Easy
REFERENCES: 4-1 The Entity Relationship Model
LEARNING OBJECTIVES: 04.01 - Identify the main characteristics of entity relationship components

23. A(n) _____ is the set of possible values for a given attribute.
a. domain b. range
c. identifier d. key
ANSWER: a
DIFFICULTY: Difficulty: Easy
REFERENCES: 4-1b Attributes
LEARNING OBJECTIVES: 04.01 - Identify the main characteristics of entity relationship components

24. Ideally, an entity identifier is composed of _____ attribute(s).
a. one b. two
c. three d. six
ANSWER: a
DIFFICULTY: Difficulty: Moderate
REFERENCES: 4-1b Attributes
LEARNING OBJECTIVES: 04.01 - Identify the main characteristics of entity relationship components

25. A _____ attribute can be further subdivided to yield additional attributes.
a. composite b. simple
c. single-valued d. multivalued
ANSWER: a
DIFFICULTY: Difficulty: Easy
REFERENCES: 4-1b Attributes
LEARNING OBJECTIVES: 04.01 - Identify the main characteristics of entity relationship components

26. A _____ attribute is one that cannot be subdivided.
a. composite b. simple
c. single-valued d. multivalued
ANSWER: b
DIFFICULTY: Difficulty: Easy
REFERENCES: 4-1b Attributes
LEARNING OBJECTIVES: 04.01 - Identify the main characteristics of entity relationship components

27. The conceptual model can handle _____ relationships and multivalued attributes.
a. 1:1 b. M:N
c. 1:M d. 1:N
ANSWER: b
DIFFICULTY: Difficulty: Moderate
REFERENCES: 4-1b Attributes
LEARNING OBJECTIVES: 04.01 - Identify the main characteristics of entity relationship components

28. A derived attribute is indicated in the Chen notation by a _____ that connects the attribute and an entity.

a. single line b. dashed line

c. double dashed line d. double line

ANSWER: b

DIFFICULTY: Difficulty: Moderate

REFERENCES: 4-1b Attributes

LEARNING OBJECTIVES: 04.01 - Identify the main characteristics of entity relationship components

29. The decision to store _____ attributes in database tables depends on the processing requirements and the constraints placed on a particular application.

a. multivalued b. derived

c. single-valued d. composite

ANSWER: b

DIFFICULTY: Difficulty: Easy

REFERENCES: 4-1b Attributes

LEARNING OBJECTIVES: 04.01 - Identify the main characteristics of entity relationship components

30. A relationship is an association between _____.

a. objects b. entities

c. databases d. fields

ANSWER: b

DIFFICULTY: Difficulty: Easy

REFERENCES: 4-1c Relationships

LEARNING OBJECTIVES: 04.02 - Describe how relationships between entities are defined, refined, and incorporated into the database design process

31. _____ expresses the minimum and maximum number of entity occurrences associated with one occurrence of the related entity.

a. Connectivity b. Relationship

c. Dependence d. Cardinality

ANSWER: d

DIFFICULTY: Difficulty: Moderate

REFERENCES: 4-1d Connectivity and Cardinality

LEARNING OBJECTIVES: 04.02 - Describe how relationships between entities are defined, refined, and incorporated into the database design process

32. In the entity relationship diagram (ERD), cardinality is indicated using the _____ notation, where max is the maximum number of associated entities and min represents the minimum number of associated entities.

a. (max, min) b. (min, max)

c. [min ... max] d. {min|max}

ANSWER: b

DIFFICULTY: Difficulty: Moderate

REFERENCES: 4-1d Connectivity and Cardinality

LEARNING OBJECTIVES: 04.02 - Describe how relationships between entities are defined, refined, and incorporated into the database design process

33. When the specific cardinalities are not included on the diagram in Crow's Foot notation, cardinality is implied by the use of _____.

a. symbols b. attributes

c. images d. tables

ANSWER: a

DIFFICULTY: Difficulty: Easy

REFERENCES: 4-1d Connectivity and Cardinality

LEARNING OBJECTIVES: 04.02 - Describe how relationships between entities are defined, refined, and incorporated into the database design process

34. Knowing the minimum and maximum number of _____ occurrences is very helpful at the application software level.

a. object b. attribute

c. data d. entity

ANSWER: d

DIFFICULTY: Difficulty: Easy

REFERENCES: 4-1d Connectivity and Cardinality

LEARNING OBJECTIVES: 04.02 - Describe how relationships between entities are defined, refined, and incorporated into the database design process

35. An entity is said to be _____-dependent if it can exist in the database only when it is associated with another related entity occurrence.

a. existence b. relationship

c. business d. data

ANSWER: a

DIFFICULTY: Difficulty: Easy

REFERENCES: 4-1e Existence Dependence

LEARNING OBJECTIVES: 04.02 - Describe how relationships between entities are defined, refined, and incorporated into the database design process

36. If an entity can exist apart from all of its related entities, then it is existence-independent, and it is referred to as a(n) _____ entity.

a. weak b. alone

c. unary d. strong

ANSWER: d

DIFFICULTY: Difficulty: Easy

REFERENCES: 4-1e Existence Dependence

LEARNING OBJECTIVES: 04.02 - Describe how relationships between entities are defined, refined, and incorporated into the database design process

37. A _____ entity has a primary key that is partially or totally derived from the parent entity in the relationship.

a. strong b. weak

c. business d. child

ANSWER: b

DIFFICULTY: Difficulty: Easy

REFERENCES: 4-1f Relationship Strength

LEARNING OBJECTIVES: 04.02 - Describe how relationships between entities are defined, refined, and incorporated into the database design process

38. The existence of a(n) _____ entity indicates that its minimum cardinality is zero.

a. ternary b. optional

c. strong d. weak

ANSWER: b

DIFFICULTY: Difficulty: Easy

REFERENCES: 4-1h Relationship Participation

LEARNING OBJECTIVES: 04.02 - Describe how relationships between entities are defined, refined, and incorporated into the database design process

39. A _____ relationship exists when an association is maintained within a single entity.

a. unary b. ternary

c. strong d. weak

ANSWER: a

DIFFICULTY: Difficulty: Easy

REFERENCES: 4-1i Relationship Degree

LEARNING OBJECTIVES: 04.02 - Describe how relationships between entities are defined, refined, and incorporated into the database design process

40. A _____ relationship exists when three entities are associated.

a. unary b. strong

c. ternary d. weak

ANSWER: c

DIFFICULTY: Difficulty: Easy

REFERENCES: 4-1i Relationship Degree

LEARNING OBJECTIVES: 04.02 - Describe how relationships between entities are defined, refined, and incorporated into the database design process

41. If an employee within an EMPLOYEE entity has a relationship with itself, that relationship is known as a _____ relationship.

a. self b. self-referring

c. looping d. recursive

ANSWER: d

DIFFICULTY: Difficulty: Moderate

REFERENCES: 4-1j Recursive Relationships

LEARNING OBJECTIVES: 04.02 - Describe how relationships between entities are defined, refined, and incorporated into the database design process

42. To simplify the conceptual design, most higher-order relationships are decomposed into appropriate equivalent _____ relationships whenever possible.

a. unary b. binary

c. strong d. weak

ANSWER: b

DIFFICULTY: Difficulty: Easy

REFERENCES: 4-1i Relationship Degree
LEARNING OBJECTIVES: 04.02 - Describe how relationships between entities are defined, refined, and incorporated into the database design process

43. The entity relationship model uses the associative entity to represent a(n) _____ relationship between two or more entities.
a. M:N b. 1:M
c. N:1 d. M:1
ANSWER: a
DIFFICULTY: Difficulty: Moderate
REFERENCES: 4-1k Associative (Composite) Entities
LEARNING OBJECTIVES: 04.02 - Describe how relationships between entities are defined, refined, and incorporated into the database design process

44. When using the Crow's Foot notation, the associative entity is indicated by _____ relationship lines between the parents and the associative entity.
a. dotted b. double
c. triple d. solid
ANSWER: d
DIFFICULTY: Difficulty: Easy
REFERENCES: 4-1k Associative (Composite) Entities
LEARNING OBJECTIVES: 04.02 - Describe how relationships between entities are defined, refined, and incorporated into the database design process

45. The first step in building an entity-relationship diagram (ERD) is _____.
a. developing the initial ERD
b. creating a detailed narrative of the organization’s description of operations
c. identifying the attributes and primary keys that adequately describe the entities
d. identifying the business rules based on the description of operations
ANSWER: b
DIFFICULTY: Difficulty: Moderate
REFERENCES: 4-2 Developing an ER Diagram
LEARNING OBJECTIVES: 04.03 - See how ERD components affect database design and implementation

46. The Crow’s foot symbol with two vertical parallel lines indicates _____ cardinality.
a. (0,N) b. (1,N)
c. (1,1) d. (0,1)
ANSWER: c
DIFFICULTY: Difficulty: Easy
REFERENCES: 4-1h Relationship Participation
LEARNING OBJECTIVES: 04.02 - Describe how relationships between entities are defined, refined, and incorporated into the database design process

47. If Tiny College has some departments that are classified as “research only” and do not offer courses, the COURSE entity of the college database would be _____ the DEPARTMENT entity.
a. existence-dependent on b. independent of

c. mandatory for d. optional to

ANSWER: d

DIFFICULTY: Difficulty: Moderate

REFERENCES: 4-2 Developing an ER Diagram

LEARNING OBJECTIVES: 04.03 - See how ERD components affect database design and implementation

48. In organizations that generate large number of transactions, _____ are often a top priority in database design.

a. relationships among entities b. logical design standards

c. naming conventions d. high processing speeds

ANSWER: d

DIFFICULTY: Difficulty: Easy

REFERENCES: 4-3 Database Design Challenges: Conflicting Goals

LEARNING OBJECTIVES: 04.04 - Understand that real-world database design often requires the reconciliation of conflicting goals

49. Complex _____ requirements may dictate data transformations, and they may expand the number of entities and attributes within the design.

a. information b. entity

c. design d. processing

ANSWER: a

DIFFICULTY: Difficulty: Easy

REFERENCES: 4-3 Database Design Challenges: Conflicting Goals

LEARNING OBJECTIVES: 04.04 - Understand that real-world database design often requires the reconciliation of conflicting goals

50. Database design is a(n) _____ process based on repetition.

a. sequential b. iterative

c. linear d. intermittent

ANSWER: b

DIFFICULTY: Difficulty: Moderate

REFERENCES: 4-2 Developing an ER Diagram

LEARNING OBJECTIVES: 04.02 - Describe how relationships between entities are defined, refined, and incorporated into the database design process

Completion

51. _____ are characteristics of entities.

ANSWER: Attributes

DIFFICULTY: Difficulty: Easy

REFERENCES: 4-1b Attributes

LEARNING OBJECTIVES: 04.01 - Identify the main characteristics of entity relationship components

52. A(n) _____ attribute is an attribute that must have a value.

ANSWER: required

DIFFICULTY: Difficulty: Easy

REFERENCES: 4-1b Attributes

LEARNING OBJECTIVES: 04.01 - Identify the main characteristics of entity relationship components

53. _____ are underlined in an ER diagram.
ANSWER: Identifiers
DIFFICULTY: Difficulty: Easy
REFERENCES: 4-1b Attributes
LEARNING OBJECTIVES: 04.01 - Identify the main characteristics of entity relationship components

54. A person's Social Security number would be an example of a(n) _____ attribute.
ANSWER: single-valued
DIFFICULTY: Difficulty: Easy
REFERENCES: 4-1b Attributes
LEARNING OBJECTIVES: 04.01 - Identify the main characteristics of entity relationship components

55. A(n) _____ attribute need not be physically stored within the database.
ANSWER: derived
DIFFICULTY: Difficulty: Easy
REFERENCES: 4-1b Attributes
LEARNING OBJECTIVES: 04.01 - Identify the main characteristics of entity relationship components

56. A relationship _____ is difficult to establish if only one side of the relationship is known.
ANSWER: classification
DIFFICULTY: Difficulty: Easy
REFERENCES: 4-1c Relationships
LEARNING OBJECTIVES: 04.02 - Describe how relationships between entities are defined, refined, and incorporated into the database design process

57. When indicating cardinality, the first value represents the _____ number of associated entities.
ANSWER: minimum
DIFFICULTY: Difficulty: Easy
REFERENCES: 4-1d Connectivity and Cardinality
LEARNING OBJECTIVES: 04.02 - Describe how relationships between entities are defined, refined, and incorporated into the database design process

58. The concept of relationship strength is based on how the _____ of a related entity is defined.
ANSWER: primary key
DIFFICULTY: Difficulty: Easy
REFERENCES: 4-1f Relationship Strength
LEARNING OBJECTIVES: 04.02 - Describe how relationships between entities are defined, refined, and incorporated into the database design process

59. A(n) _____ relationship is also known as an identifying relationship.
ANSWER: strong
DIFFICULTY: Difficulty: Easy
REFERENCES: 4-1f Relationship Strength
LEARNING OBJECTIVES: 04.02 - Describe how relationships between entities are defined, refined, and incorporated

into the database design process

60. The Crow's Foot notation depicts the strong relationship with a(n) _____ line between the entities.
ANSWER: solid
DIFFICULTY: Difficulty: Easy
REFERENCES: 4-1f Relationship Strength
LEARNING OBJECTIVES: 04.02 - Describe how relationships between entities are defined, refined, and incorporated into the database design process

61. A weak entity must be _____-dependent.
ANSWER: existence
DIFFICULTY: Difficulty: Moderate
REFERENCES: 4-1g Weak Entities
LEARNING OBJECTIVES: 04.02 - Describe how relationships between entities are defined, refined, and incorporated into the database design process

62. The Chen notation identifies a weak entity by using a double-walled entity _____.
ANSWER: rectangle
DIFFICULTY: Difficulty: Easy
REFERENCES: 4-1g Weak Entities
LEARNING OBJECTIVES: 04.02 - Describe how relationships between entities are defined, refined, and incorporated into the database design process

63. Participation is _____ if one entity occurrence does not require a corresponding entity occurrence in a particular relationship.
ANSWER: optional
DIFFICULTY: Difficulty: Moderate
REFERENCES: 4-1h Relationship Participation
LEARNING OBJECTIVES: 04.02 - Describe how relationships between entities are defined, refined, and incorporated into the database design process

64. In Crow's Foot notation, an optional relationship between entities is shown by drawing a(n) _____ on the side of the optional entity.
ANSWER: small circle (O)
DIFFICULTY: Difficulty: Easy
REFERENCES: 4-1h Relationship Participation
LEARNING OBJECTIVES: 04.02 - Describe how relationships between entities are defined, refined, and incorporated into the database design process

65. Failure to understand the distinction between mandatory and optional _____ in relationships might yield designs in which awkward (and unnecessary) temporary rows (entity instances) must be created just to accommodate the creation of required entities.
ANSWER: participation
DIFFICULTY: Difficulty: Easy
REFERENCES: 4-1h Relationship Participation
LEARNING OBJECTIVES: 04.02 - Describe how relationships between entities are defined, refined, and incorporated into the database design process

66. A relationship _____ indicates the number of entities or participants associated with a relationship.

ANSWER: degree
DIFFICULTY: Difficulty: Easy
REFERENCES: 4-1i Relationship Degree
LEARNING OBJECTIVES: 04.02 - Describe how relationships between entities are defined, refined, and incorporated into the database design process

67. A(n) _____ process is based on repetition of processes and procedures.

ANSWER: iterative
DIFFICULTY: Difficulty: Easy
REFERENCES: 4-2 Developing an ER Diagram
LEARNING OBJECTIVES: 04.03 - See how ERD components affect database design and implementation

68. Identifying the attributes of entities helps in the better understanding of _____ among entities.

ANSWER: relationships
DIFFICULTY: Difficulty: Easy
REFERENCES: 4-2 Developing an ER Diagram
LEARNING OBJECTIVES: 04.03 - See how ERD components affect database design and implementation

69. _____ not only helps database designers to stay on track during the design process, it also enables them to pick up the design thread when the time comes to modify the design.

ANSWER: Documentation
DIFFICULTY: Difficulty: Easy
REFERENCES: 4-3 Database Design Challenges: Conflicting Goals
LEARNING OBJECTIVES: 04.04 - Understand that real-world database design often requires the reconciliation of conflicting goals

70. In organizations that generate large numbers of transactions, _____ processing speeds are often a top priority in database design, which result in minimal access time.

ANSWER: high
DIFFICULTY: Difficulty: Moderate
REFERENCES: 4-3 Database Design Challenges: Conflicting
LEARNING OBJECTIVES: 04.04 - Understand that real-world database design often requires the reconciliation of conflicting goals

Essay

71. Explain multivalued attributes with the help of examples. How are multivalued attributes indicated in the Chen Entity Relationship model?

ANSWER: Multivalued attributes are attributes that can have many values. For instance, a person may have several college degrees, and a household may have several different phones, each with its own number. Similarly, a car's color may be subdivided into many colors for the roof, body, and trim. In the Chen Entity Relationship model, multivalued attributes are shown by a double line connecting the attribute to the entity.
DIFFICULTY: Difficulty: Moderate
REFERENCES: 4-1b Attributes

LEARNING OBJECTIVES: 04.01 - Identify the main characteristics of entity relationship components

72. What is a weak relationship? Provide an example.

ANSWER: A weak relationship, also known as a non-identifying relationship, exists if the primary key of the related entity does not contain a primary key component of the parent entity. By default, relationships are established by having the primary key of the parent entity appear as a foreign key (FK) on the related entity (also known as the child entity). For example, suppose the 1:M relationship between COURSE and CLASS is defined as:
COURSE (**CRS_CODE**, DEPT_CODE, CRS_DESCRIPTION, CRS_CREDIT)
CLASS (**CLASS_CODE**, CRS_CODE, CLASS_SECTION, CLASS_TIME, ROOM_CODE, PROF_NUM)
In this case, a weak relationship exists between COURSE and CLASS because CRS_CODE (the primary key of the parent entity) is only a foreign key in the CLASS entity. In this example, the CLASS primary key did not inherit a primary key component from the COURSE entity.

DIFFICULTY: Difficulty: Moderate

REFERENCES: 4-1f Relationship Strength

LEARNING OBJECTIVES: 04.02 - Describe how relationships between entities are defined, refined, and incorporated into the database design process

73. Explain mandatory participation in an entity relationship.

ANSWER: Mandatory participation means that one entity occurrence requires a corresponding entity occurrence in a particular relationship. If no optionality symbol is depicted with the entity, the entity is assumed to exist in a mandatory relationship with the related entity. If the mandatory participation is depicted graphically, it is typically shown as a small hash mark across the relationship line, similar to the Crow's Foot depiction of a connectivity of 1. The existence of a mandatory relationship indicates that the minimum cardinality is at least 1 for the mandatory entity.

DIFFICULTY: Difficulty: Moderate

REFERENCES: 4-1h Relationship Participation

LEARNING OBJECTIVES: 04.02 - Describe how relationships between entities are defined, refined, and incorporated into the database design process

74. What is a ternary relationship? Provide some business rules examples that specify the need for a ternary or higher-order relationship.

ANSWER: A ternary relationship implies an association among three different entities. Although most relationships are binary, the use of ternary and higher-order relationships does allow the designer some latitude regarding the semantics of a problem. Some business rules examples that specify the need for a ternary relationship are:
• A DOCTOR writes one or more PRESCRIPTIONs.
• A PATIENT may receive one or more PRESCRIPTIONs.
• A DRUG may appear in one or more PRESCRIPTIONs. (Assume that the business rule states that each prescription contains only one drug. In short, if a doctor prescribes more than one drug, a separate prescription must be written for each drug.)

DIFFICULTY: Difficulty: Moderate

REFERENCES: 4-1i Relationship Degree

LEARNING OBJECTIVES: 04.02 - Describe how relationships between entities are defined, refined, and incorporated into the database design process

75. Explain recursive relationships with the help of an example.

ANSWER:	A recursive relationship is one in which a relationship can exist between occurrences of the same entity set. Such a condition is found within a unary relationship. For example, a 1:M unary relationship can be expressed by "an EMPLOYEE may manage many EMPLOYEEs, and each EMPLOYEE is managed by one EMPLOYEE." Finally, the M:N unary relationship may be expressed by "a COURSE may be a prerequisite to many other COURSEs, and each COURSE may have many other COURSEs as prerequisites."
DIFFICULTY:	Difficulty: Moderate
REFERENCES:	4-1j Recursive Relationships
LEARNING OBJECTIVES:	04.02 - Describe how relationships between entities are defined, refined, and incorporated into the database design process

Chapter 05: Advanced Data Modeling

True / False

1. The entity supertype contains common characteristics, and the entity subtypes each contain their own unique characteristics.

a. True

b. False

ANSWER: True

DIFFICULTY: Difficulty: Easy

REFERENCES: 5-1a Entity Supertypes and Subtypes

LEARNING OBJECTIVES: 05.01 - Describe the main extended entity relationship (EER) model constructs and how they are represented in ERDs and EERDs

2. Entity supertypes and subtypes are organized in a specialization hierarchy.

a. True

b. False

ANSWER: True

DIFFICULTY: Difficulty: Easy

REFERENCES: 5-1b Specialization Hierarchy

LEARNING OBJECTIVES: 05.01 - Describe the main extended entity relationship (EER) model constructs and how they are represented in ERDs and EERDs

3. The relationships depicted within the specialization hierarchy are sometimes described in terms of “is-a” relationships.

a. True

b. False

ANSWER: True

DIFFICULTY: Difficulty: Moderate

REFERENCES: 5-1b Specialization Hierarchy

LEARNING OBJECTIVES: 05.01 - Describe the main extended entity relationship (EER) model constructs and how they are represented in ERDs and EERDs

4. Within a specialization hierarchy, a supertype can exist only within the context of a subtype.

a. True

b. False

ANSWER: False

DIFFICULTY: Difficulty: Easy

REFERENCES: 5-1b Specialization Hierarchy

LEARNING OBJECTIVES: 05.01 - Describe the main extended entity relationship (EER) model constructs and how they are represented in ERDs and EERDs

5. One important inheritance characteristic is that all entity subtypes inherit their primary key attribute from their supertype.

a. True

b. False

ANSWER: True
DIFFICULTY: Difficulty: Easy
REFERENCES: 5-1c Inheritance
LEARNING OBJECTIVES: 05.01 -
Describe the main extended entity relationship (EER) model constructs and how they are represented in ERDs and EERDs

6. A subtype contains attributes that are common to all of its supertypes.
   a. True
   b. False

ANSWER: False
DIFFICULTY: Difficulty: Moderate
REFERENCES: 5-1c Inheritance
LEARNING OBJECTIVES: 05.01 -
Describe the main extended entity relationship (EER) model constructs and how they are represented in ERDs and EERDs

7. At the implementation level, the supertype and its subtype(s) depicted in the specialization hierarchy maintain a 1:1 relationship.
   a. True
   b. False

ANSWER: True
DIFFICULTY: Difficulty: Easy
REFERENCES: 5-1c Inheritance
LEARNING OBJECTIVES: 05.01 -
Describe the main extended entity relationship (EER) model constructs and how they are represented in ERDs and EERDs

8. Entity subtypes do not inherit the relationships in which the supertype entity participates.
   a. True
   b. False

ANSWER: False
DIFFICULTY: Difficulty: Easy
REFERENCES: 5-1c Inheritance
LEARNING OBJECTIVES: 05.01 -
Describe the main extended entity relationship (EER) model constructs and how they are represented in ERDs and EERDs

9. In specialization hierarchies with multiple levels of supertype and subtypes, a lower-level subtype can inherit only a few of the attributes and relationships from its upper-level supertypes.
   a. True
   b. False

ANSWER: False
DIFFICULTY: Difficulty: Moderate
REFERENCES: 5-1c Inheritance
LEARNING OBJECTIVES: 05.01 -
Describe the main extended entity relationship (EER) model constructs and how they are

represented in ERDs and EERDs

10. The property of a subtype discriminator enables an entity supertype to inherit the attributes and relationships of the subtype.

a. True

b. False

ANSWER: False

DIFFICULTY: Difficulty: Easy

REFERENCES: 5-1d Subtype Discriminator

LEARNING OBJECTIVES: 05.01 -
Describe the main extended entity relationship (EER) model constructs and how they are represented in ERDs and EERDs

11. An entity supertype can have disjoint or overlapping entity subtypes.

a. True

b. False

ANSWER: True

DIFFICULTY: Difficulty: Easy

REFERENCES: 5-1e Disjoint and Overlapping Constraints

LEARNING OBJECTIVES: 05.01 -
Describe the main extended entity relationship (EER) model constructs and how they are represented in ERDs and EERDs

12. Disjoint subtypes are subtypes that contain nonunique subsets of the supertype entity set.

a. True

b. False

ANSWER: False

DIFFICULTY: Difficulty: Easy

REFERENCES: 5-1e Disjoint and Overlapping Constraints

LEARNING OBJECTIVES: 05.01 -
Describe the main extended entity relationship (EER) model constructs and how they are represented in ERDs and EERDs

13. Overlapping subtypes are subtypes that contain a unique subset of the supertype entity set.

a. True

b. False

ANSWER: False

DIFFICULTY: Difficulty: Easy

REFERENCES: 5-1e Disjoint and Overlapping Constraints

LEARNING OBJECTIVES: 05.01 -
Describe the main extended entity relationship (EER) model constructs and how they are represented in ERDs and EERDs

14. Implementing overlapping subtypes requires the use of one discriminator attribute for each subtype.

a. True

b. False

ANSWER: True

DIFFICULTY: Difficulty: Moderate
REFERENCES: 5-1e Disjoint and Overlapping Constraints
LEARNING OBJECTIVES: 05.01 - Describe the main extended entity relationship (EER) model constructs and how they are represented in ERDs and EERDs

15. The completeness constraint can be partial or total.
    a. True
    b. False
ANSWER: True
DIFFICULTY: Difficulty: Easy
REFERENCES: 5-1f Completeness Constraint
LEARNING OBJECTIVES: 05.01 - Describe the main extended entity relationship (EER) model constructs and how they are represented in ERDs and EERDs

16. Specialization is the top-down process of identifying lower-level, more specific entity subtypes from a higher-level entity supertype.
    a. True
    b. False
ANSWER: True
DIFFICULTY: Difficulty: Moderate
REFERENCES: 5-1g Specialization and Generalization
LEARNING OBJECTIVES: 05.01 - Describe the main extended entity relationship (EER) model constructs and how they are represented in ERDs and EERDs

17. An entity cluster is a "virtual" entity type used to represent multiple entities and relationships in the ERD.
    a. True
    b. False
ANSWER: True
DIFFICULTY: Difficulty: Easy
REFERENCES: 5-2 Entity Clustering
LEARNING OBJECTIVES: 05.02 - Use entity clusters to represent multiple entities and relationships in an entity relationship

18. The function of the primary key is to describe an entity.
    a. True
    b. False
ANSWER: False
DIFFICULTY: Difficulty: Moderate
REFERENCES: 5-3b Primary Key Guidelines
LEARNING OBJECTIVES: 05.03 - Describe the characteristics of good primary keys and how to select them

19. To model time-variant data, one must create a new entity in an M:N relationship with the original entity.
    a. True

b. False

ANSWER: False
DIFFICULTY: Difficulty: Moderate
REFERENCES: 5-4b Design Case 2: Maintaining History of Time-Variant Data
LEARNING OBJECTIVES: 05.04 - Apply flexible solutions for special data-modeling cases

20. A design trap occurs when a relationship is improperly or incompletely identified and is therefore represented in a way that is not consistent with the real world.

a. True

b. False

ANSWER: True
DIFFICULTY: Difficulty: Easy
REFERENCES: 5-4c Design Case 3: Fan Traps
LEARNING OBJECTIVES: 05.04 - Apply flexible solutions for special data-modeling cases

Multiple Choice

21. The extended entity relationship model (EERM) is sometimes referred to as the _____.

a. enclosed entity relationship model b. enhanced entity relationship model

c. entity clustering relationship model d. extended entity relationship diagram

ANSWER: b
DIFFICULTY: Difficulty: Easy
REFERENCES: 5-1 The Extended Entity Relationship Model
LEARNING OBJECTIVES: 05.01 -
Describe the main extended entity relationship (EER) model constructs and how they are represented in ERDs and EERDs

22. A(n)_____ is a generic entity type that is related to one or more entity subtypes.

a. subtype discriminator b. inheritance

c. specialization hierarchy d. entity supertype

ANSWER: d
DIFFICULTY: Difficulty: Easy
REFERENCES: 5-1a Entity Supertypes and Subtypes
LEARNING OBJECTIVES: 05.01 -
Describe the main extended entity relationship (EER) model constructs and how they are represented in ERDs and EERDs

23. The _____ depicts the arrangement of higher-level entity supertypes (parent entities) and lower-level entity subtypes (child entities).

a. subtype discriminator b. inheritance

c. specialization hierarchy d. entity supertype

ANSWER: c
DIFFICULTY: Difficulty: Easy
REFERENCES: 5-1b Specialization Hierarchy
LEARNING OBJECTIVES: 05.01 -
Describe the main extended entity relationship (EER) model constructs and how they are

represented in ERDs and EERDs

24. Within a specialization hierarchy, every subtype can have _____ supertype(s) to which it is directly related.

a. zero b. only one

c. one or many d. many

ANSWER: b

DIFFICULTY: Difficulty: Moderate

REFERENCES: 5-1b Specialization Hierarchy

LEARNING OBJECTIVES: 05.01 - Describe the main extended entity relationship (EER) model constructs and how they are represented in ERDs and EERDs

25. A specialization hierarchy can have _____ level(s) of supertype/subtype relationships.

a. zero b. only one

c. one or many d. many

ANSWER: d

DIFFICULTY: Difficulty: Easy

REFERENCES: 5-1b Specialization Hierarchy

LEARNING OBJECTIVES: 05.01 - Describe the main extended entity relationship (EER) model constructs and how they are represented in ERDs and EERDs

26. The property of _____ enables an entity subtype to inherit the attributes and relationships of the supertype.

a. subtype discriminator b. inheritance

c. specialization hierarchy d. entity supertype

ANSWER: b

DIFFICULTY: Difficulty: Easy

REFERENCES: 5-1c Inheritance

LEARNING OBJECTIVES: 05.01 - Describe the main extended entity relationship (EER) model constructs and how they are represented in ERDs and EERDs

27. One important inheritance characteristic is that all entity subtypes inherit their _____ key attribute from their supertype.

a. primary b. natural

c. foreign d. surrogate

ANSWER: a

DIFFICULTY: Difficulty: Moderate

REFERENCES: 5-1c Inheritance

LEARNING OBJECTIVES: 05.01 - Describe the main extended entity relationship (EER) model constructs and how they are represented in ERDs and EERDs

28. At the implementation level, the supertype and its subtype(s) depicted in a specialization hierarchy maintain a(n) _____ relationship.

a. self-referencing b. 1:1

c. 1:M d. M:N

ANSWER: b
DIFFICULTY: Difficulty: Easy
REFERENCES: 5-1c Inheritance
LEARNING OBJECTIVES: 05.01 -
Describe the main extended entity relationship (EER) model constructs and how they are represented in ERDs and EERDs

29. A(n) _____ is the attribute in the supertype entity that determines to which entity subtype each supertype occurrence is related.

a. subtype discriminator b. inheritance discriminator
c. specialization hierarchy d. entity supertype

ANSWER: a
DIFFICULTY: Difficulty: Easy
REFERENCES: 5-1d Subtype Discriminator
LEARNING OBJECTIVES: 05.01 -
Describe the main extended entity relationship (EER) model constructs and how they are represented in ERDs and EERDs

30. The default comparison condition for the subtype discriminator attribute is the _____ comparison.

a. nonequality b. less than
c. greater than d. equality

ANSWER: d
DIFFICULTY: Difficulty:Easy
REFERENCES: 5-1d Subtype Discriminator
LEARNING OBJECTIVES: 05.01 -
Describe the main extended entity relationship (EER) model constructs and how they are represented in ERDs and EERDs

31. Which of the following is a specialization hierarchy disjoint constraint scenario in case of partial completeness?

a. Subtype discriminator can be null.
b. Subtype discriminator cannot be null.
c. Each supertype occurrence is a member of only one subtype.
d. Each supertype occurrence is a member of at least one subtype.

ANSWER: a
DIFFICULTY: Difficulty: Moderate
REFERENCES: 5-1f Completeness Constraint
LEARNING OBJECTIVES: 05.01 -
Describe the main extended entity relationship (EER) model constructs and how they are represented in ERDs and EERDs

32. Which of the following is a specialization hierarchy overlapping constraint scenario in case of partial completeness?

a. Subtype sets are unique.
b. Supertype has optional subtypes.
c. Subtype discriminators cannot be null.
d. Subtype does not have a supertype.

ANSWER: b

DIFFICULTY: Difficulty: Moderate
REFERENCES: 5-1f Completeness Constraint
LEARNING OBJECTIVES: 05.01 -
Describe the main extended entity relationship (EER) model constructs and how they are represented in ERDs and EERDs

33. Nonoverlapping subtypes are subtypes that contain a(n) _____ subset of the supertype entity set.
a. entity b. subtypes
c. unique d. nonunique
ANSWER: c
DIFFICULTY: Difficulty: Easy
REFERENCES: 5-1e Disjoint and Overlapping Constraints
LEARNING OBJECTIVES: 05.01 -
Describe the main extended entity relationship (EER) model constructs and how they are represented in ERDs and EERDs

34. Overlapping subtypes are subtypes that contain _____ subsets of the supertype entity set.
a. null b. exclusive
c. solitary d. nonunique
ANSWER: d
DIFFICULTY: Difficulty: Easy
REFERENCES: 5-1e Disjoint and Overlapping Constraints
LEARNING OBJECTIVES: 05.01 -
Describe the main extended entity relationship (EER) model constructs and how they are represented in ERDs and EERDs

35. A total completeness constraint is represented by a _____.
a. smaller circle inside a bigger circle
b. rhombus inside a circle
c. double horizontal line under a circle
d. single horizontal line above a circle
ANSWER: c
DIFFICULTY: Difficulty: Easy
REFERENCES: 5-1f Completeness Constraint
LEARNING OBJECTIVES: 05.01 -
Describe the main extended entity relationship (EER) model constructs and how they are represented in ERDs and EERDs

36. A partial completeness constraint is represented by _____.
a. a dotted line b. two dashed lines
c. a single horizontal line under a circle d. a double horizontal line over a circle
ANSWER: c
DIFFICULTY: Difficulty:Easy
REFERENCES: 5-1f Completeness Constraint
LEARNING OBJECTIVES: 05.01 -
Describe the main extended entity relationship (EER) model constructs and how they are

represented in ERDs and EERDs

37. In the context of total completeness, in a(n) _____, every supertype occurrence is a member of only one subtype.
    a. foreign key constraint
    b. nonunique constraint
    c. overlapping constraint
    d. disjoint constraint

ANSWER: d
DIFFICULTY: Difficulty: Moderate
REFERENCES: 5-1f Completeness Constraint
LEARNING OBJECTIVES: 05.01 - Describe the main extended entity relationship (EER) model constructs and how they are represented in ERDs and EERDs

38. In the context of total completeness, in a(n) _____, every supertype occurrence is a member of at least one subtype.
    a. unique constraint
    b. disjoint constraint
    c. overlapping constraint
    d. foreign key constraint

ANSWER: c
DIFFICULTY: Difficulty: Moderate
REFERENCES: 5-1f Completeness Constraint
LEARNING OBJECTIVES: 05.01 - Describe the main extended entity relationship (EER) model constructs and how they are represented in ERDs and EERDs

39. _____ is the bottom-up process of identifying a higher-level, more generic entity supertype from lower-level entity subtypes.
    a. Specialization b. Generalization
    c. Normalization d. Total completeness

ANSWER: b
DIFFICULTY: Difficulty: Easy
REFERENCES: 5-1g Specialization and Generalization
LEARNING OBJECTIVES: 05.01 - Describe the main extended entity relationship (EER) model constructs and how they are represented in ERDs and EERDs

40. The purpose of an entity _____ is to simplify an entity-relationship diagram (ERD) and thus enhance its readability.
    a. constraint b. cluster
    c. interface d. discriminator

ANSWER: b
DIFFICULTY: Difficulty: Easy
REFERENCES: 5-2 Entity Clustering
LEARNING OBJECTIVES: 05.02 - Use entity clusters to represent multiple entities and relationships in an entity relationship

41. An entity cluster is formed by combining multiple interrelated entities into _____.
    a. a single abstract entity object b. multiple abstract entity objects
    c. a single entity object d. multiple entity objects

ANSWER: a
DIFFICULTY: Difficulty: Easy
REFERENCES: 5-2 Entity Clustering
LEARNING OBJECTIVES: 05.02 - Use entity clusters to represent multiple entities and relationships in an entity relationship

42. The most important characteristic of an entity is its _____ key, used to uniquely identify each entity instance.
    a. primary b. natural
    c. foreign d. surrogate

ANSWER: a
DIFFICULTY: Difficulty: Easy
REFERENCES: 5-3 Entity Integrity: Selecting Primary Keys
LEARNING OBJECTIVES: 05.03 - Describe the characteristics of good primary keys and how to select them

43. A _____ key is a real-world, generally accepted identifier used to uniquely identify real-world objects.
    a. primary b. natural
    c. foreign d. surrogate

ANSWER: b
DIFFICULTY: Difficulty: Easy
REFERENCES: 5-3a Natural Keys and Primary Keys
LEARNING OBJECTIVES: 05.03 - Describe the characteristics of good primary keys and how to select them

44. If one exists, a data modeler uses a _____ as the primary key of the entity being modeled.
    a. foreign key b. combination key
    c. surrogate key d. natural identifier

ANSWER: d
DIFFICULTY: Difficulty: Easy
REFERENCES: 5-3a Natural Keys and Primary Keys
LEARNING OBJECTIVES: 05.03 - Describe the characteristics of good primary keys and how to select them

45. A _____ is a primary key created by a database designer to simplify the identification of entity instances.
    a. composite key b. compound key
    c. natural key d. surrogate key

ANSWER: d
DIFFICULTY: Difficulty: Easy
REFERENCES: 5-3d When to Use Surrogate Primary Keys
LEARNING OBJECTIVES: 05.03 - Describe the characteristics of good primary keys and how to select them

46. Composite primary keys are particularly useful as identifiers of composite entities, where each primary key combination is allowed only once in the _____ relationship.
    a. 0:1 b. 1:1
    c. 1:M d. M:N

ANSWER: d
DIFFICULTY: Difficulty: Easy
REFERENCES: 5-3c When to Use Composite Primary Keys
LEARNING OBJECTIVES: 05.03 - Describe the characteristics of good primary keys and how to select them

47. The "_____" characteristic of a primary key states that the selected primary key must not be composed of any attribute(s) that might be considered a violation.
a. unique values b. nonintelligent
c. preferably single-attribute d. security-compliant
ANSWER: d
DIFFICULTY: Difficulty: Easy
REFERENCES: 5-3b Primary Key Guidelines
LEARNING OBJECTIVES: 05.03 - Describe the characteristics of good primary keys and how to select them

48. The "_____" characteristic of a primary key states that the primary key must uniquely identify each entity instance, must be able to guarantee unique values, and must not contain nulls.
a. unique values b. nonintelligent
c. preferably single-attribute d. security-complaint
ANSWER: a
DIFFICULTY: Difficulty: Easy
REFERENCES: 5-3b Primary Key Guidelines
LEARNING OBJECTIVES: 05.03 - Describe the characteristics of good primary keys and how to select them

49. According to the "preferably single-attribute" characteristic of a primary key, the primary key:
a. must be able to guarantee unique attribute values.
b. should have the minimum number of attributes possible.
c. should have embedded semantic meaning associated with each attribute.
d. must be composed of attributes that are free from security risks or violations.
ANSWER: b
DIFFICULTY: Difficulty: Moderate
REFERENCES: 5-3b Primary Key Guidelines
LEARNING OBJECTIVES: 05.03 - Describe the characteristics of good primary keys and how to select them

50. The "_____" characteristic of a primary key states that the primary key should not have embedded semantic meaning.
a. unique values b. nonintelligent
c. preferably single-attribute d. security-compliant
ANSWER: b
DIFFICULTY: Difficulty: Easy
REFERENCES: 5-3b Primary Key Guidelines
LEARNING OBJECTIVES: 05.03 - Describe the characteristics of good primary keys and how to select them

Completion

51. The _____ is the result of adding more semantic constructs to the original entity relationship (ER) model.
ANSWER: extended entity relationship model (EERM)

EERM (extended entity relationship model)
extended entity relationship model
EERM

DIFFICULTY: Difficulty: Easy

REFERENCES: 5-1 The Extended Entity Relationship Model

LEARNING OBJECTIVES: 05.01 -
Describe the main extended entity relationship (EER) model constructs and how they are represented in ERDs and EERDs

52. Disjoint subtypes are also known as _____ subtypes.

ANSWER: non-overlapping
nonoverlapping

DIFFICULTY: Difficulty: Easy

REFERENCES: 5-1e Disjoint and Overlapping Constraints

LEARNING OBJECTIVES: 05.01 -
Describe the main extended entity relationship (EER) model constructs and how they are represented in ERDs and EERDs

53. Subtypes that contain nonunique subsets of the supertype entity set are known as _____ subtypes.

ANSWER: overlapping

DIFFICULTY: Difficulty: Easy

REFERENCES: 5-1e Disjoint and Overlapping Constraints

LEARNING OBJECTIVES: 05.01 -
Describe the main extended entity relationship (EER) model constructs and how they are represented in ERDs and EERDs

54. The _____ specifies whether each entity supertype occurrence must also be a member of at least one subtype.

ANSWER: completeness constraint

DIFFICULTY: Difficulty: Easy

REFERENCES: 5-1f Completeness Constraint

LEARNING OBJECTIVES: 05.01 -
Describe the main extended entity relationship (EER) model constructs and how they are represented in ERDs and EERDs

55. _____ completeness means that not every supertype occurrence is a member of a subtype.

ANSWER: Partial

DIFFICULTY: Difficulty: Easy

REFERENCES: 5-1f Completeness Constraint

LEARNING OBJECTIVES: 05.01 -
Describe the main extended entity relationship (EER) model constructs and how they are represented in ERDs and EERDs

56. _____ completeness means that every supertype occurrence must be a member of at least one subtype.

ANSWER: Total

DIFFICULTY: Difficulty: Easy

REFERENCES: 5-1f Completeness Constraint

LEARNING OBJECTIVES: 05.01 -

Describe the main extended entity relationship (EER) model constructs and how they are represented in ERDs and EERDs

57. Specialization is based on grouping _____ characteristics and relationships of the subtypes.
ANSWER: unique
DIFFICULTY: Difficulty: Easy
REFERENCES: 5-1g Specialization and Generalization
LEARNING OBJECTIVES: 05.01 - Describe the main extended entity relationship (EER) model constructs and how they are represented in ERDs and EERDs

58. An entity cluster is considered "virtual" or "_____" in the sense that it is not actually an entity in the final ERD.
ANSWER: abstract
DIFFICULTY: Difficulty: Easy
REFERENCES: 5-2 Entity Clustering
LEARNING OBJECTIVES: 05.02 - Use entity clusters to represent multiple entities and relationships in an entity relationship

59. Usually, a data modeler uses a natural identifier as the _____ of the entity being modeled, assuming that the entity has a natural identifier.
ANSWER: primary key
DIFFICULTY: Difficulty: Easy
REFERENCES: 5-3a Natural Keys and Primary Keys
LEARNING OBJECTIVES: 05.03 - Describe the characteristics of good primary keys and how to select them

60. Unique values can be better managed when they are _____, because the database can use internal routines to implement a counter-style attribute that automatically increments values with the addition of each new row.
ANSWER: numeric
DIFFICULTY: Difficulty: Easy
REFERENCES: 5-3b Primary Key Guidelines
LEARNING OBJECTIVES: 05.03 - Describe the characteristics of good primary keys and how to select them

61. Composite primary keys are particularly useful as identifiers of composite entities, where each primary key combination is allowed _____ in the M:N relationship.
ANSWER: only once
once
DIFFICULTY: Difficulty: Moderate
REFERENCES: 5-3c When to Use Composite Primary Keys
LEARNING OBJECTIVES: 05.03 - Describe the characteristics of good primary keys and how to select them

62. Composite keys are useful as identifiers of weak entities, where the weak entity has a strong _____ relationship with the parent entity.
ANSWER: identifying
DIFFICULTY: Difficulty: Moderate
REFERENCES: 5-3c When to Use Composite Primary Keys
LEARNING OBJECTIVES: 05.03 - Describe the characteristics of good primary keys and how to select them

63. A weak entity in a strong identifying relationship with a parent entity is normally used to represent a(n) _____ that is represented in the data model as two separate entities.
ANSWER: real-world object
DIFFICULTY: Difficulty: Easy
REFERENCES: 5-3c When to Use Composite Primary Keys
LEARNING OBJECTIVES: 05.03 - Describe the characteristics of good primary keys and how to select them

64. One practical advantage of a(n) _____ key is that because it has no intrinsic meaning, values for it can be generated by the DBMS to ensure that unique values are always provided.
ANSWER: surrogate
DIFFICULTY: Difficulty: Easy
REFERENCES: 5-3d When to Use Surrogate Primary Keys
LEARNING OBJECTIVES: 05.03 - Describe the characteristics of good primary keys and how to select them

65. While using a surrogate key, one must ensure that the candidate key of the entity in question performs properly through the use of the "_____" and "not null" constraints.
ANSWER: unique index
DIFFICULTY: Difficulty: Moderate
REFERENCES: 5-3d When to Use Surrogate Primary Keys
LEARNING OBJECTIVES: 05.03 - Describe the characteristics of good primary keys and how to select them

66. From a data modeling point of view, _____ data refer to data whose values change over time and for which one must keep a history of the data changes.
ANSWER: time-variant
DIFFICULTY: Difficulty: Easy
REFERENCES: 5-4b Design Case 2: Maintaining History of Time-Variant Data
LEARNING OBJECTIVES: 05.04 - Apply flexible solutions for special data-modeling cases

67. A(n) _____ occurs when a relationship is improperly or incompletely identified and is therefore represented in a way that is not consistent with the real world.
ANSWER: design trap
DIFFICULTY: Difficulty: Easy
REFERENCES: 5-4c Design Case 3: Fan Traps
LEARNING OBJECTIVES: 05.04 - Apply flexible solutions for special data-modeling cases

68. The main concern with redundant relationships is that they remain _____ across the model.
ANSWER: consistent
DIFFICULTY: Difficulty: Moderate
REFERENCES: 5-4d Design Case 4: Redundant Relationships
LEARNING OBJECTIVES: 05.04 - Apply flexible solutions for special data-modeling cases

69. _____ keys work with primary keys to properly implement relationships in the relational model.
ANSWER: Foreign
DIFFICULTY: Difficulty: Easy
REFERENCES: 5-4a Design Case 1: Implementing 1:1 Relationships
LEARNING OBJECTIVES: 05.04 - Apply flexible solutions for special data-modeling cases

70. A(n) _____ occurs when you have one entity in two 1:M relationships to other entities, thus producing an association among the other entities that is not expressed in the model.

ANSWER: fan trap
DIFFICULTY: Difficulty: Moderate
REFERENCES: 5-4c Design Case 3: Fan Traps
LEARNING OBJECTIVES: 05.04 - Apply flexible solutions for special data-modeling cases

Essay

71. What do specialization hierarchies do?

ANSWER: Entity supertypes and subtypes are organized in a specialization hierarchy, which depicts the arrangement of higher-level entity supertypes (parent entities) and lower-level entity subtypes (child entities). Specialization hierarchies enable the data model to capture additional semantic content (meaning) into the ERD. A specialization hierarchy provides the means to:
• Support attribute inheritance.
• Define a special supertype attribute known as the subtype discriminator.
• Define disjoint/overlapping constraints and complete/partial constraints.
DIFFICULTY: Difficulty: Moderate
REFERENCES: 5-1b Specialization Hierarchy
LEARNING OBJECTIVES: 05.01 -
Describe the main extended entity relationship (EER) model constructs and how they are represented in ERDs and EERDs

72. Differentiate between specialization and generalization.

ANSWER: Specialization is the top-down process of identifying lower-level, more specific entity subtypes from a higher-level entity supertype. Specialization is based on grouping the unique characteristics and relationships of the subtypes. On the other hand, generalization is the bottom-up process of identifying a higher-level, more generic entity supertype from lower-level entity subtypes. Generalization is based on grouping the common characteristics and relationships of the subtypes.
DIFFICULTY: Difficulty: Moderate
REFERENCES: 5-1g Specialization and Generalization
LEARNING OBJECTIVES: 05.01 -
Describe the main extended entity relationship (EER) model constructs and how they are represented in ERDs and EERDs

73. Explain the two criteria that help a designer in determining when to use subtypes and supertypes.

ANSWER: Two criteria help a designer determine when to use subtypes and supertypes:

1. There must be different, identifiable kinds or types of an entity in the user's environment.

2. The different kinds or types of instances should each have one or more attributes that are unique to that kind or type of instance.

DIFFICULTY: Difficulty: Moderate
REFERENCES: 5-1a Entity Supertypes and Subtypes
LEARNING OBJECTIVES: 05.01 -
Describe the main extended entity relationship (EER) model constructs and how they are represented in ERDs and EERDs

74. Explain the “no change over time” characteristic of a primary key.

ANSWER: If an attribute has semantic meaning, it might be subject to updates, which is why names do not make good primary keys. If a primary key is subject to change, the foreign key values must be updated, thus adding to the database work load. Furthermore, changing a primary key value means that one is basically changing the identity of an entity. In short, the PK should be permanent and unchangeable.

DIFFICULTY: Difficulty: Moderate

REFERENCES: 5-3b Primary Key Guidelines

LEARNING OBJECTIVES: 05.03 - Describe the characteristics of good primary keys and how to select them

75. In which two cases are composite primary keys particularly useful?

ANSWER: Composite primary keys are particularly useful in two cases:

1. As identifiers of composite entities, in which each primary key combination is allowed only once in the M:N relationship.
2. As identifiers of weak entities, in which the weak entity has a strong identifying relationship with the parent entity.

DIFFICULTY: Difficulty: Moderate

REFERENCES: 5-3c When to Use Composite Primary Keys

LEARNING OBJECTIVES: 05.03 - Describe the characteristics of good primary keys and how to select them

Chapter 06: Normalization of Database Tables

True / False

1. Normalization works through a series of stages called normal forms.
   a. True
   b. False

ANSWER: True
DIFFICULTY: Difficulty: Easy
REFERENCES: 6-1 Database Tables and Normalization
LEARNING OBJECTIVES: 06.01 - Explain normalization and its role in the database design process

2. Normalization is a process that is used for changing attributes to entities.
   a. True
   b. False

ANSWER: False
DIFFICULTY: Difficulty: Easy
REFERENCES: 6-1 Database Tables and Normalization
LEARNING OBJECTIVES: 06.01 - Explain normalization and its role in the database design process

3. In order to meet performance requirements, portions of the database design may need to be occasionally denormalized.
   a. True
   b. False

ANSWER: True
DIFFICULTY: Difficulty: Easy
REFERENCES: 6-1 Database Tables and Normalization
LEARNING OBJECTIVES: 06.01 - Explain normalization and its role in the database design process

4. Denormalization produces a lower normal form.
   a. True
   b. False

ANSWER: True
DIFFICULTY: Difficulty: Easy
REFERENCES: 6-1 Database Tables and Normalization
LEARNING OBJECTIVES: 06.01 - Explain normalization and its role in the database design process

5. The objective of normalization is to ensure that each table conforms to the concept of well-formed relations.
   a. True
   b. False

ANSWER: True
DIFFICULTY: Difficulty: Easy
REFERENCES: 6-3 The Normalization Process
LEARNING OBJECTIVES: 06.03 - Explain how normal forms can be transformed from lower normal forms to higher normal forms

6. Relational models view data as part of a table or collection of tables in which all key values must be identified.
   a. True

b. False

ANSWER: True
DIFFICULTY: Difficulty: Easy
REFERENCES: 6-3a Conversion to First Normal Form (1NF)
LEARNING OBJECTIVES: 06.03 - Explain how normal forms can be transformed from lower normal forms to higher normal forms

7. Repeating groups must be eliminated by ensuring that each row defines a single entity.
a. True
b. False

ANSWER: True
DIFFICULTY: Difficulty: Moderate
REFERENCES: 6-3a Conversion to First Normal Form (1NF)
LEARNING OBJECTIVES: 06.03 - Explain how normal forms can be transformed from lower normal forms to higher normal forms

8. A dependency of one nonprime attribute on another nonprime attribute is a partial dependency.
a. True
b. False

ANSWER: False
DIFFICULTY: Difficulty: Easy
REFERENCES: 6-3 The Normalization Process
LEARNING OBJECTIVES: 06.03 - Explain how normal forms can be transformed from lower normal forms to higher normal forms

9. Dependency diagrams are very helpful in getting a bird's-eye view of all the relationships among a table's attributes.
a. True
b. False

ANSWER: True
DIFFICULTY: Difficulty: Easy
REFERENCES: 6-3a Conversion to First Normal Form (1NF)
LEARNING OBJECTIVES: 06.03 - Explain how normal forms can be transformed from lower normal forms to higher normal forms

10. Dependencies that are based on only a part of a composite primary key are called transitive dependencies.
a. True
b. False

ANSWER: False
DIFFICULTY: Difficulty: Easy
REFERENCES: 6-3 The Normalization Process
LEARNING OBJECTIVES: 06.03 - Explain how normal forms can be transformed from lower normal forms to higher normal forms

11. All relational tables satisfy the 1NF requirements.
a. True
b. False

ANSWER: True
DIFFICULTY: Difficulty: Easy
REFERENCES: 6-3a Conversion to First Normal Form (1NF)
LEARNING OBJECTIVES: 06.03 - Explain how normal forms can be transformed from lower normal forms to higher normal forms

12. In the context of partial dependencies, data redundancies occur because every row entry requires duplication of data.
    a. True
    b. False

ANSWER: True
DIFFICULTY: Difficulty: Easy
REFERENCES: 6-3a Conversion to First Normal Form (1NF)
LEARNING OBJECTIVES: 06.03 - Explain how normal forms can be transformed from lower normal forms to higher normal forms

13. Since a partial dependency can exist only if a table's primary key is composed of several attributes, if a table in 1NF has a single-attribute primary key, then the table is automatically in 2NF.
    a. True
    b. False

ANSWER: True
DIFFICULTY: Difficulty: Moderate
REFERENCES: 6-3b Conversion to Second Normal Form (2NF)
LEARNING OBJECTIVES: 06.03 - Explain how normal forms can be transformed from lower normal forms to higher normal forms

14. It is possible for a table in 2NF to exhibit transitive dependency, where the primary key may rely on one or more nonprime attributes to functionally determine other nonprime attributes.
    a. True
    b. False

ANSWER: True
DIFFICULTY: Difficulty: Moderate
REFERENCES: 6-3b Conversion to Second Normal Form (2NF)
LEARNING OBJECTIVES: 06.03 - Explain how normal forms can be transformed from lower normal forms to higher normal forms

15. Data stored at their highest level of granularity are said to be atomic data.
    a. True
    b. False

ANSWER: False
DIFFICULTY: Difficulty: Easy
REFERENCES: 6-4 Improving the Design
LEARNING OBJECTIVES: 06.04 - Apply normalization rules to evaluate and correct table structures

16. A table is in BCNF if every determinant in the table is a foreign key.
    a. True
    b. False

ANSWER: False
DIFFICULTY: Difficulty: Easy
REFERENCES: 6-6a The Boyce-Codd Normal Form
LEARNING OBJECTIVES: 06.03 - Explain how normal forms can be transformed from lower normal forms to higher normal forms

17. A table is in fourth normal form if it is in third normal form and has no independent multivalued dependencies.
    a. True
    b. False
ANSWER: True
DIFFICULTY: Difficulty: Easy
REFERENCES: 6-6b Fourth Normal Form (4NF)
LEARNING OBJECTIVES: 06.03 - Explain how normal forms can be transformed from lower normal forms to higher normal forms

18. Normalization represents a micro view of the entities within the ERD.
    a. True
    b. False
ANSWER: True
DIFFICULTY: Difficulty: Easy
REFERENCES: 6-7 Normalization and Database Design
LEARNING OBJECTIVES: 06.04 - Apply normalization rules to evaluate and correct table structures

19. The combination of normalization and ER modeling yields a useful ERD, whose entities can be translated into appropriate table structures.
    a. True
    b. False
ANSWER: True
DIFFICULTY: Difficulty: Easy
REFERENCES: 6-7 Normalization and Database Design
LEARNING OBJECTIVES: 06.04 - Apply normalization rules to evaluate and correct table structures

20. Normalization purity is often easy to sustain in the modern database environment.
    a. True
    b. False
ANSWER: False
DIFFICULTY: Difficulty: Easy
REFERENCES: 6-8 Denormalization
LEARNING OBJECTIVES: 06.05 - Identify situations that require denormalization to generate information efficiently

Multiple Choice

21. From a structural point of view, 3NF is better than _____.
    a. 2NF b. 3NF
    c. 5NF d. 6NF
ANSWER: a

DIFFICULTY: Difficulty: Easy
REFERENCES: 6-1 Database Tables and Normalization
LEARNING OBJECTIVES: 06.01 - Explain normalization and its role in the database design process

22. Normalization works through a series of stages called normal forms. For most purposes in business database design, _____ stages are as high as you need to go in the normalization process.
a. two b. three
c. four d. five
ANSWER: b
DIFFICULTY: Difficulty: Moderate
REFERENCES: 6-1 Database Tables and Normalization
LEARNING OBJECTIVES: 06.01 - Explain normalization and its role in the database design process

23. From a structural point of view, 2NF is better than _____.
a. 1NF b. 3NF
c. 4NF d. BCNF
ANSWER: a
DIFFICULTY: Difficulty: Easy
REFERENCES: 6-1 Database Tables and Normalization
LEARNING OBJECTIVES: 06.01 - Explain normalization and its role in the database design process

24. An attribute that is part of a key is known as a(n) _____ attribute.
a. important b. nonprime
c. prime d. entity
ANSWER: c
DIFFICULTY: Difficulty: Easy
REFERENCES: 6-1 Database Tables and Normalization
LEARNING OBJECTIVES: 06.01 - Explain normalization and its role in the database design process

25. Attribute A _____ attribute B if all of the rows in the table that agree in value for attribute A also agree in value for attribute B.
a. determines b. derives from
c. controls d. owns
ANSWER: a
DIFFICULTY: Difficulty: Moderate
REFERENCES: 6-3 The Normalization Process
LEARNING OBJECTIVES: 06.03 - Explain how normal forms can be transformed from lower normal forms to higher normal forms

26. Some very specialized applications may require normalization beyond the _____.
a. 1NF b. 2NF
c. 3NF d. 4NF
ANSWER: d
DIFFICULTY: Difficulty: Easy
REFERENCES: 6-3 The Normalization Process

LEARNING OBJECTIVES: 06.03 - Explain how normal forms can be transformed from lower normal forms to higher normal forms

27. Of the following normal forms, _____ is mostly of theoretical interest.

a. 1NF b. 3NF

c. BCNF d. DKNF

ANSWER: d

DIFFICULTY: Difficulty: Easy

REFERENCES: 6-3 The Normalization Process

LEARNING OBJECTIVES: 06.03 - Explain how normal forms can be transformed from lower normal forms to higher normal forms

28. A table that has all key attributes defined, has no repeating groups, and all its attributes are dependent on the primary key is said to be in _____.

a. 1NF b. 2NF

c. 3NF d. 4NF

ANSWER: a

DIFFICULTY: Difficulty: Easy

REFERENCES: 6-3a Conversion to First Normal Form (1NF)

LEARNING OBJECTIVES: 06.02 - Identify and describe each of the normal forms: 1NF, 2NF, 3NF, BCNF, and 4NF

29. A(n) _____ exists when there are functional dependencies such that Y is functionally dependent on X, Z is functionally dependent on Y, and X is the primary key.

a. partial dependency b. repeating group

c. atomic attribute d. transitive dependency

ANSWER: d

DIFFICULTY: Difficulty: Moderate

REFERENCES: 6-3 The Normalization Process

LEARNING OBJECTIVES: 06.03 - Explain how normal forms can be transformed from lower normal forms to higher normal forms

30. A _____ derives its name from the fact that a collection of multiple entries of the same type can exist for any single key attribute occurrence.

a. partial dependency b. transitive dependency

c. repeating group d. primary key

ANSWER: c

DIFFICULTY: Difficulty: Easy

REFERENCES: 6-3a Conversion to First Normal Form (1NF)

LEARNING OBJECTIVES: 06.03 - Explain how normal forms can be transformed from lower normal forms to higher normal forms

31. A relational table must not contain a(n) _____.

a. entity b. attribute

c. relationship d. repeating group

ANSWER: d

DIFFICULTY: Difficulty: Easy

REFERENCES: 6-3a Conversion to First Normal Form (1NF)
LEARNING OBJECTIVES: 06.03 - Explain how normal forms can be transformed from lower normal forms to higher normal forms

32. In a(n) _____ diagram, the arrows above the attributes indicate all desirable dependencies.
a. Chen b. dependency
c. functionality d. ER
ANSWER: b
DIFFICULTY: Difficulty: Moderate
REFERENCES: 6-3a Conversion to First Normal Form (1NF)
LEARNING OBJECTIVES: 06.03 - Explain how normal forms can be transformed from lower normal forms to higher normal forms

33. Dependencies based on only a part of a composite primary key are known as _____ dependencies.
a. primary b. partial
c. incomplete d. composite
ANSWER: b
DIFFICULTY: Difficulty: Easy
REFERENCES: 6-3 The Normalization Process
LEARNING OBJECTIVES: 06.03 - Explain how normal forms can be transformed from lower normal forms to higher normal forms

34. If a table has multiple candidate keys and one of those candidate keys is a composite key, the table can have _____ based on this composite candidate key even when the primary key chosen is a single attribute.
a. Boyce-Codd normal forms b. redundancies
c. time-variances d. partial dependencies
ANSWER: d
DIFFICULTY: Difficulty: Easy
REFERENCES: 6-3c Conversion to Third Normal Form (3NF)
LEARNING OBJECTIVES: 06.03 - Explain how normal forms can be transformed from lower normal forms to higher normal forms

35. A table that is in 2NF and contains no transitive dependencies is said to be in _____.
a. 1NF b. 2NF
c. 3NF d. 4NF
ANSWER: c
DIFFICULTY: Difficulty: Easy
REFERENCES: 6-3c Conversion to Third Normal Form (3NF)
LEARNING OBJECTIVES: 06.03 - Explain how normal forms can be transformed from lower normal forms to higher normal forms

36. Improving _____ leads to more flexible queries.
a. atomicity b. normalization
c. denormalization d. derived attribute
ANSWER: a
DIFFICULTY: Difficulty: Easy

REFERENCES: 6-4 Improving the Design
LEARNING OBJECTIVES: 06.04 - Apply normalization rules to evaluate and correct table structures

37. An atomic attribute _____.
a. cannot exist in a relational table
b. cannot be further subdivided
c. displays multiplicity
d. is always chosen to be a foreign key
ANSWER: b
DIFFICULTY: Difficulty: Easy
REFERENCES: 6-4 Improving the Design
LEARNING OBJECTIVES: 06.04 - Apply normalization rules to evaluate and correct table structures

38. The most likely data type for a surrogate key is _____.
a. character
b. date
c. logical
d. numeric
ANSWER: d
DIFFICULTY: Difficulty: Easy
REFERENCES: 6-4 Improving the Design
LEARNING OBJECTIVES: 06.04 - Apply normalization rules to evaluate and correct table structures

39. Granularity refers to _____.
a. the size of a table
b. the level of detail represented by the values in a table's row
c. the number of attributes represented in a table
d. the number of rows in a table
ANSWER: b
DIFFICULTY: Difficulty: Easy
REFERENCES: 6-4 Improving the Design
LEARNING OBJECTIVES: 06.04 - Apply normalization rules to evaluate and correct table structures

40. From a system functionality point of view, _____ attribute values can be calculated when they are needed to write reports or invoices.
a. derived
b. atomic
c. granular
d. historical
ANSWER: a
DIFFICULTY: Difficulty: Moderate
REFERENCES: 6-4 Improving the Design
LEARNING OBJECTIVES: 06.04 - Apply normalization rules to evaluate and correct table structures

41. In a real-world environment, we must strike a balance between design integrity and _____.
a. robustness
b. flexibility
c. uniqueness
d. ease of use
ANSWER: b
DIFFICULTY: Difficulty: Easy
REFERENCES: 6-5 Surrogate Key Considerations
LEARNING OBJECTIVES: 06.04 - Apply normalization rules to evaluate and correct table structures

42. To generate a surrogate key, Microsoft Access uses a(n) _____ data type.

a. character b. sequence

c. AutoNumber d. identity

ANSWER: c

DIFFICULTY: Difficulty: Easy

REFERENCES: 6-5 Surrogate Key Considerations

LEARNING OBJECTIVES: 06.04 - Apply normalization rules to evaluate and correct table structures

43. BCNF can be violated only if the table contains more than one _____ key.

a. primary b. candidate

c. foreign d. secondary

ANSWER: b

DIFFICULTY: Difficulty: Moderate

REFERENCES: 6-6a The Boyce-Codd Normal Form

LEARNING OBJECTIVES: 06.03 - Explain how normal forms can be transformed from lower normal forms to higher normal forms

44. When a table contains only one candidate key, _____ are considered to be equivalent.

a. the 1NF and the 2NF b. the 3NF and the BCNF

c. the 4NF and the 3NF d. the BCNF and the DKNF

ANSWER: b

DIFFICULTY: Difficulty: Moderate

REFERENCES: 6-6a The Boyce-Codd Normal Form

LEARNING OBJECTIVES: 06.03 - Explain how normal forms can be transformed from lower normal forms to higher normal forms

45. In a _____ situation, one key determines multiple values of two other attributes and those attributes are independent of each other.

a. multivalued dependency b. transitive dependency

c. partial dependency d. functional dependency

ANSWER: a

DIFFICULTY: Difficulty: Easy

REFERENCES: 6-6b Fourth Normal Form (4NF)

LEARNING OBJECTIVES: 06.03 - Explain how normal forms can be transformed from lower normal forms to higher normal forms

46. A table where all attributes are dependent on the primary key but are independent of each other, and no row contains two or more multivalued facts about an entity is said to be in _____.

a. 1NF b. 2NF

c. 3NF d. 4NF

ANSWER: d

DIFFICULTY: Difficulty: Easy

REFERENCES: 6-6b Fourth Normal Form (4NF)

LEARNING OBJECTIVES: 06.03 - Explain how normal forms can be transformed from lower normal forms to higher normal forms

47. A table is in 4NF if it is in 3NF, and _____.

a. all attributes must be dependent on the primary key and must be dependent on each other

b. all attributes are unrelated

c. it has no multivalued dependencies

d. no column contains the same values

ANSWER: c
DIFFICULTY: Difficulty: Easy
REFERENCES: 6-3 The Normalization Process
LEARNING OBJECTIVES: 06.02 - Identify and describe each of the normal forms: 1NF, 2NF, 3NF, BCNF, and 4NF

48. An example of denormalization is using a _____ denormalized table to hold report data. This is required when creating a tabular report in which the columns represent data that are stored in the table as rows.

a. transitive b. 3NF

c. component d. temporary

ANSWER: d
DIFFICULTY: Difficulty: Easy
REFERENCES: 6-8 Denormalization
LEARNING OBJECTIVES: 06.05 - Identify situations that require denormalization to generate information efficiently

49. Data warehouse routinely uses _____ structures in its complex, multilevel, multisource data environment.

a. 1NF b. 2NF

c. 3NF d. 4NF

ANSWER: b
DIFFICULTY: Difficulty: Moderate
REFERENCES: 6-8 Denormalization
LEARNING OBJECTIVES: 06.05 - Identify situations that require denormalization to generate information efficiently

50. _____ databases reflect the ever-growing demand for greater scope and depth in the data on which decision support systems increasingly rely.

a. Normalized b. Data warehouse

c. Temporary d. Report

ANSWER: b
DIFFICULTY: Difficulty: Moderate
REFERENCES: 6-8 Denormalization
LEARNING OBJECTIVES: 06.05 - Identify situations that require denormalization to generate information efficiently

Completion

51. If database tables are treated as though they were files in a file system, the _____ never has a chance to demonstrate its superior data-handling capabilities.

ANSWER: RDBMS
relational database management system
relational database management system (RDBMS)
RDBMS (relational database management system)
DIFFICULTY: Difficulty: Easy
REFERENCES: 6-1 Database Tables and Normalization

LEARNING OBJECTIVES: 06.01 - Explain normalization and its role in the database design process

52. The price paid for increased performance through denormalization is a larger amount of _____.
ANSWER: redundancy
data redundancy
DIFFICULTY: Difficulty: Easy
REFERENCES: 6-1 Database Tables and Normalization
LEARNING OBJECTIVES: 06.01 - Explain normalization and its role in the database design process

53. A dependency based on only a part of a composite primary key is called a(n) _____.
ANSWER: partial dependency
DIFFICULTY: Difficulty: Easy
REFERENCES: 6-3 The Normalization Process
LEARNING OBJECTIVES: 06.01 - Explain normalization and its role in the database design process

54. In order to meet _____ requirements, you may have to denormalize some portions of a database design.
ANSWER: performance
DIFFICULTY: Difficulty: Easy
REFERENCES: 6-1 Database Tables and Normalization
LEARNING OBJECTIVES: 06.01 - Explain normalization and its role in the database design process

55. _____ is a process to help reduce the likelihood of data anomalies.
ANSWER: Normalization
DIFFICULTY: Difficulty: Easy
REFERENCES: 6-1 Database Tables and Normalization
LEARNING OBJECTIVES: 06.01 - Explain normalization and its role in the database design process

56. Any attribute that is at least part of a key is known as a(n) _____.
ANSWER: prime attribute
key attribute
DIFFICULTY: Difficulty: Easy
REFERENCES: 6-1 Database Tables and Normalization
LEARNING OBJECTIVES: 06.01 - Explain normalization and its role in the database design process

57. When designing a new database structure based on the business requirements of the end users, the database designer will construct a data model using a technique such as _____.
ANSWER: Crow's Foot notation ERDs
DIFFICULTY: Difficulty: Easy
REFERENCES: 6-2 The Need for Normalization
LEARNING OBJECTIVES: 06.01 - Explain normalization and its role in the database design process

58. The _____ is central to a discussion of normalization.
ANSWER: concept of keys
DIFFICULTY: Difficulty: Easy
REFERENCES: 6-3 The Normalization Process
LEARNING OBJECTIVES: 06.01 - Explain normalization and its role in the database design process

59. All relational tables satisfy the _____ requirements.
ANSWER: 1NF
first normal form
first normal form (1NF)
1NF (first normal form)
DIFFICULTY: Difficulty: Easy
REFERENCES: 6-3a Conversion to First Normal Form (1NF)
LEARNING OBJECTIVES: 06.02 - Identify and describe each of the normal forms: 1NF, 2NF, 3NF, BCNF, and 4NF

60. Because a partial dependency can exist only when a table's primary key is composed of several attributes, a table whose _____ key consists of only a single attribute is automatically in 2NF once it is in 1NF.
ANSWER: primary
DIFFICULTY: Difficulty: Moderate
REFERENCES: 6-3b Conversion to Second Normal Form (2NF)
LEARNING OBJECTIVES: 06.02 - Identify and describe each of the normal forms: 1NF, 2NF, 3NF, BCNF, and 4NF

61. Any attribute whose value determines other values within a row is known as a(n) _____.
ANSWER: determinant
DIFFICULTY: Difficulty: Easy
REFERENCES: 6-3c Conversion to Third Normal Form (3NF)
LEARNING OBJECTIVES: 06.02 - Identify and describe each of the normal forms: 1NF, 2NF, 3NF, BCNF, and 4NF

62. An attribute that cannot be further subdivided is said to display _____.
ANSWER: atomicity
DIFFICULTY: Difficulty: Easy
REFERENCES: 6-4 Improving the Design
LEARNING OBJECTIVES: 06.04 - Apply normalization rules to evaluate and correct table structures

63. _____ refers to the level of detail represented by the values stored in a table's row.
ANSWER: Granularity
DIFFICULTY: Difficulty: Easy
REFERENCES: 6-4 Improving the Design
LEARNING OBJECTIVES: 06.04 - Apply normalization rules to evaluate and correct table structures

64. In a real-world environment, changing granularity requirements might dictate changes in primary key selection, and those changes might ultimately require the use of _____ keys.
ANSWER: surrogate
DIFFICULTY: Difficulty: Easy
REFERENCES: 6-4 Improving the Design
LEARNING OBJECTIVES: 06.04 - Apply normalization rules to evaluate and correct table structures

65. It becomes difficult to create a suitable _____ key when the related table uses a composite primary key.
ANSWER: foreign
DIFFICULTY: Difficulty: Easy
REFERENCES: 6-5 Surrogate Key Considerations

LEARNING OBJECTIVES: 06.04 - Apply normalization rules to evaluate and correct table structures

66. In the _____, no row may contain two or more multivalued facts about an entity.
ANSWER: 4NF
fourth normal form
fourth normal form (4NF)
4NF (fourth normal form)
DIFFICULTY: Difficulty: Moderate
REFERENCES: 6-6b Fourth Normal Form (4NF)
LEARNING OBJECTIVES: 06.03 - Explain how normal forms can be transformed from lower normal forms to higher normal forms

67. An ERD is created through a(n) _____ process.
ANSWER: iterative
DIFFICULTY: Difficulty: Easy
REFERENCES: 6-7 Normalization and Database Design
LEARNING OBJECTIVES: 06.04 - Apply normalization rules to evaluate and correct table structures

68. The combination of _____ and ER modeling yields a useful ERD, whose entities may now be translated into appropriate table structures.
ANSWER: normalization
DIFFICULTY: Difficulty: Easy
REFERENCES: 6-7 Normalization and Database Design
LEARNING OBJECTIVES: 06.04 - Apply normalization rules to evaluate and correct table structures

69. Unnormalized tables yield no simple strategies for creating virtual tables known as _____.
ANSWER: views
DIFFICULTY: Difficulty:Easy
REFERENCES: 6-8 Denormalization
LEARNING OBJECTIVES: 06.05 - Identify situations that require denormalization to generate information efficiently

70. According to the data-modeling checklist, _____ should be nouns that are familiar to business, should be short and meaningful, and should document abbreviations, synonyms, and aliases for each entity.
ANSWER: entity names
DIFFICULTY: Difficulty: Easy
REFERENCES: 6-9 Data-Modeling Checklist
LEARNING OBJECTIVES: 06.06 - Use a data-modeling checklist to check that the ERD meets a set of minimum requirements

Essay

71. Explain normalization and its different forms.
ANSWER: Normalization is a process for evaluating and correcting table structures to minimize data redundancies, thereby reducing the likelihood of data anomalies. The normalization process involves assigning attributes to tables based on the concept of determination. Normalization works through a series of stages called normal forms. The first three stages are described as first normal form (1NF), second normal form (2NF), and third normal form (3NF). From a structural point of view, 2NF is better than 1NF, and 3NF is better than 2NF. For most

purposes in business database design, 3NF is as high as you need to go in the normalization process. However, you will discover that properly designed 3NF structures also meet the requirements of fourth normal form (4NF).

DIFFICULTY: Difficulty: Moderate

REFERENCES: 6-1 Database Tables and Normalization

LEARNING OBJECTIVES: 06.01 - Explain normalization and its role in the database design process

72. What characteristics do tables that conform to the concept of well-informed relations have?

ANSWER: Tables that conform to the concept of well-informed relations have the following characteristics:

1. Each table represents a single subject.
2. No data item will be unnecessarily stored in more than one table. This results in tables that have lower redundancies. The reason for this requirement is to ensure that the data is updates in only one place.
3. All nonprime attributes in a table are dependent on the primary key alone. The reason for this requirement is to ensure that the data is uniquely identifiable by a primary key value.
4. Each table is void of insertion, update, or deletion anomalies, which ensure the integrity and consistency of the data.

DIFFICULTY: Difficulty: Moderate

REFERENCES: 6-3 The Normalization Process

LEARNING OBJECTIVES: 06.01 - Explain normalization and its role in the database design process

73. Describe a dependency diagram and explain its purpose.

ANSWER: Dependency diagrams are very helpful in getting a bird's eye view of all the relationships among a table's attributes, and their use makes it less likely that you will overlook an important dependency.
The following are features of a dependency diagram:

1. The primary key attributes are bold, underlined, and shaded in a different color.
2. The arrows above the attributes indicate all desirable dependencies—that is, dependencies based on the primary key.
3. The arrows below the dependency diagram indicate less desirable dependencies. Two types of such dependencies exist:
   a. Partial dependencies. A dependency based on only a part of a composite primary key is a partial dependency.
   b. Transitive dependencies. A transitive dependency is a dependency of one nonprime attribute on another nonprime attribute. The problem with transitive dependencies is that they still yield data anomalies.

DIFFICULTY: Difficulty: Moderate

REFERENCES: 6-3a Conversion to First Normal Form (1NF)

LEARNING OBJECTIVES: 06.03 - Explain how normal forms can be transformed from lower normal forms to higher normal forms

74. What steps are involved in the conversion to third normal form?

ANSWER: Step 1: Make New Tables to Eliminate Transitive Dependencies
For every transitive dependency, write a copy of its determinant as a primary key for a new table. A determinant is any attribute whose value determines other values within a row. If

you have three different transitive dependencies, you will have three different determinants. As with the conversion to 2NF, it is important for the determinant remain in the original table to serve as a foreign key.
Step 2: Reassign Corresponding Dependent Attributes
Identify the attributes that are dependent on each determinant identified in Step 1. Place the dependent attributes in the new tables with their determinants and remove them from their original tables.

DIFFICULTY: Difficulty: Moderate

REFERENCES: 6-3c Conversion to Third Normal Form (3NF)

LEARNING OBJECTIVES: 06.03 - Explain how normal forms can be transformed from lower normal forms to higher normal forms

75. Explain the Boyce-Codd normal form (BCNF). How is it related to other normal forms?

ANSWER: A table is in Boyce-Codd normal form (BCNF) when every determinant in the table is a candidate key. A candidate key has the same characteristics as a primary key, but for some reason, it was not chosen to be the primary key. Clearly, when a table contains only one candidate key, the 3NF and the BCNF are equivalent. In other words, BCNF can be violated only when the table contains more than one candidate key. Most designers consider the BCNF to be a special case of the 3NF. In fact, if the techniques shown in this chapter are used, most tables conform to the BCNF requirements once the 3NF is reached.

DIFFICULTY: Difficulty: Moderate

REFERENCES: 6-6a The Boyce-Codd Normal Form

LEARNING OBJECTIVES: 06.03 - Explain how normal forms can be transformed from lower normal forms to higher normal forms

Chapter 07: Introduction to Structured Query Language (SQL)

True / False

1. A database language enables the user to perform complex queries designed to transform the raw data into useful information.
   a. True
   b. False

ANSWER: True
DIFFICULTY: Difficulty: Easy
REFERENCES: 7-1 Introduction to SQL
LEARNING OBJECTIVES: 07.01 - Retrieve specified columns of data from a database

2. SQL is considered difficult to learn; its command set has a vocabulary of more than 300 words.
   a. True
   b. False

ANSWER: False
DIFFICULTY: Difficulty: Easy
REFERENCES: 7-1 Introduction to SQL
LEARNING OBJECTIVES: 07.01 - Retrieve specified columns of data from a database

3. The ANSI SQL standards are also accepted by the ISO.
   a. True
   b. False

ANSWER: True
DIFFICULTY: Difficulty: Easy
REFERENCES: 7-1 Introduction to SQL
LEARNING OBJECTIVES: 07.01 - Retrieve specified columns of data from a database

4. The COMMIT command does not permanently save all changes. In order to do that, you must use SAVE.
   a. True
   b. False

ANSWER: False
DIFFICULTY: Difficulty: Easy
REFERENCES: 7-1 Introduction to SQL
LEARNING OBJECTIVES: 07.01 - Retrieve specified columns of data from a database

5. All SQL commands must be issued on a single line.
   a. True
   b. False

ANSWER: False
DIFFICULTY: Difficulty: Easy
REFERENCES: 7-2 Basic SELECT Queries
LEARNING OBJECTIVES: 07.02 - Join multiple tables in a single SQL query

6. Although SQL commands can be grouped together on a single line, complex command sequences are best shown on separate lines, with space between the SQL command and the command's components.
   a. True

b. False

ANSWER: True
DIFFICULTY: Difficulty: Easy
REFERENCES: 7-2 Basic SELECT Queries
LEARNING OBJECTIVES: 07.02 - Join multiple tables in a single SQL query

7. An alias cannot be used when a table is required to be joined to itself in a recursive query.
a. True
b. False

ANSWER: False
DIFFICULTY: Difficulty: Moderate
REFERENCES: 7-4h Recursive Joins
LEARNING OBJECTIVES: 07.02 - Join multiple tables in a single SQL query

8. Oracle users can use the Access QBE (query by example) query generator.
a. True
b. False

ANSWER: False
DIFFICULTY: Difficulty: Easy
REFERENCES: 7-6a Selecting Rows with Conditional Restrictions
LEARNING OBJECTIVES: 07.03 - Restrict data retrievals to rows that match complex criteria

9. You can select partial table contents by naming the desired fields and by placing restrictions on the rows to be included in the output.
a. True
b. False

ANSWER: True
DIFFICULTY: Difficulty: Easy
REFERENCES: 7-6a Selecting Rows with Conditional Restrictions
LEARNING OBJECTIVES: 07.03 - Restrict data retrievals to rows that match complex criteria

10. Comparison operators cannot be used to place restrictions on character-based attributes.
a. True
b. False

ANSWER: False
DIFFICULTY: Difficulty: Easy
REFERENCES: 7-6b Using Comparison Operators on Character Attributes
LEARNING OBJECTIVES: 07.03 - Restrict data retrievals to rows that match complex criteria

11. String comparisons are made from left to right.
a. True
b. False

ANSWER: True
DIFFICULTY: Difficulty: Easy
REFERENCES: 7-6b Using Comparison Operators on Character Attributes

LEARNING OBJECTIVES: 07.03 - Restrict data retrievals to rows that match complex criteria

12. Date procedures are often more software-specific than other SQL procedures.
    a. True
    b. False

ANSWER: True
DIFFICULTY: Difficulty: Easy
REFERENCES: 7-6c Using Comparison Operators on Dates
LEARNING OBJECTIVES: 07.03 - Restrict data retrievals to rows that match complex criteria

13. SQL allows the use of logical restrictions on its inquiries such as OR, AND, and NOT.
    a. True
    b. False

ANSWER: True
DIFFICULTY: Difficulty: Easy
REFERENCES: 7-6d Logical Operators: AND, OR, and NOT
LEARNING OBJECTIVES: 07.03 - Restrict data retrievals to rows that match complex criteria

14. You cannot insert a row containing a null attribute value using SQL.
    a. True
    b. False

ANSWER: False
DIFFICULTY: Difficulty: Easy
REFERENCES: 7-6f Special Operators
LEARNING OBJECTIVES: 07.01 - Retrieve specified columns of data from a database

15. ANSI-standard SQL allows the use of special operators in conjunction with the WHERE clause.
    a. True
    b. False

ANSWER: True
DIFFICULTY: Difficulty: Easy
REFERENCES: 7-6f Special Operators
LEARNING OBJECTIVES: 07.03 - Restrict data retrievals to rows that match complex criteria

16. The conditional LIKE must be used in conjunction with wildcard characters.
    a. True
    b. False

ANSWER: True
DIFFICULTY: Difficulty: Moderate
REFERENCES: 7-6f Special Operators
LEARNING OBJECTIVES: 07.03 - Restrict data retrievals to rows that match complex criteria

17. Most SQL implementations yield case-insensitive searches.
    a. True
    b. False

ANSWER: False
DIFFICULTY: Difficulty: Easy
REFERENCES: 7-6f Special Operators
LEARNING OBJECTIVES: 07.03 - Restrict data retrievals to rows that match complex criteria

18. Some RDBMSs, such as Microsoft Access, automatically make the necessary conversions to eliminate case sensitivity.
    a. True
    b. False
ANSWER: True
DIFFICULTY: Difficulty: Easy
REFERENCES: 7-6f Special Operators
LEARNING OBJECTIVES: 07.03 - Restrict data retrievals to rows that match complex criteria

19. The COUNT function is designed to tally the number of non-null "values" of an attribute, and is often used in conjunction with the DISTINCT clause.
    a. True
    b. False
ANSWER: True
DIFFICULTY: Difficulty: Moderate
REFERENCES: 7-7a Aggregate Functions
LEARNING OBJECTIVES: 07.04 - Aggregate data across groups of rows

20. Numeric functions take one numeric parameter and return one value.
    a. True
    b. False
ANSWER: True
DIFFICULTY: Difficulty: Moderate
REFERENCES: 7-9b Numeric Functions
LEARNING OBJECTIVES: 07.06 - Identify and use a variety of SQL functions for string, numeric, and date manipulation

Multiple Choice

21. The SQL data manipulation command HAVING:
    a. restricts the selection of rows based on a conditional expression.
    b. restricts the selection of grouped rows based on a condition.
    c. modifies an attribute's values in one or more table's rows.
    d. groups the selected rows based on one or more attributes.
ANSWER: b
DIFFICULTY: Difficulty: Moderate
REFERENCES: 7-1 Introduction to SQL
LEARNING OBJECTIVES: 07.01 - Retrieve specified columns of data from a database

22. The SQL command that allows a user to permanently save data changes is _____.
    a. INSERT b. SELECT
    c. COMMIT d. UPDATE

ANSWER: c
DIFFICULTY: Difficulty: Easy
REFERENCES: 7-1 Introduction to SQL
LEARNING OBJECTIVES: 07.01 - Retrieve specified columns of data from a database

23. The _____ command defines a default value for a column when no value is given.
a. CHECK b. UNIQUE
c. NOT NULL d. DEFAULT
ANSWER: d
DIFFICULTY: Difficulty: Easy
REFERENCES: 7-1 Introduction to SQL
LEARNING OBJECTIVES: 07.01 - Retrieve specified columns of data from a database

24. The _____ command restricts the selection of grouped rows based on a condition.
a. DISPLAY b. HAVING
c. FROM d. CONVERT
ANSWER: b
DIFFICULTY: Difficulty: Easy
REFERENCES: 7-1 Introduction to SQL
LEARNING OBJECTIVES: 07.01 - Retrieve specified columns of data from a database

25. A(n) _____ query specifies which data should be retrieved and how it should be filtered, aggregated, and displayed.
a. INSERT b. SELECT
c. COMMIT d. UPDATE
ANSWER: b
DIFFICULTY: Difficulty: Easy
REFERENCES: 7-1b SQL Queries
LEARNING OBJECTIVES: 07.01 - Retrieve specified columns of data from a database

26. A(n) _____ is an alternate name given to a column or table in any SQL statement.
a. alias b. data type
c. stored function d. trigger
ANSWER: a
DIFFICULTY: Difficulty: Easy
REFERENCES: 7-3a Using Column Aliases
LEARNING OBJECTIVES: 07.03 - Restrict data retrievals to rows that match complex criteria

27. According to the rules of precedence, which of the following computations should be completed first?
a. Additions and subtractions b. Multiplications and divisions
c. Operations within parentheses d. Power operations
ANSWER: c
DIFFICULTY: Difficulty: Moderate
REFERENCES: 7-3c Arithmetic Operators: The Rule of Precedence
LEARNING OBJECTIVES: 07.02 - Join multiple tables in a single SQL query

28. Which query is used to list a unique value for V_CODE, where the list will produce only a list of those values that are different from one another?

a. SELECT ONLY V_CODE
FROM PRODUCT;

b. SELECT UNIQUE V_CODE
FROM PRODUCT;

c. SELECT DIFFERENT V_CODE
FROM PRODUCT;

d. SELECT DISTINCT V_CODE
FROM PRODUCT;

ANSWER: a
DIFFICULTY: Difficulty: Moderate
REFERENCES: 7-3e Listing Unique Values
LEARNING OBJECTIVES: 07.01 - Retrieve specified columns of data from a database

29. When using a(n) _____ join, only rows from the tables that match on a common value are returned.

a. full b. outer
c. inner d. set

ANSWER: c
DIFFICULTY: Difficulty: Moderate
REFERENCES: 7-4 FROM Clause Options
LEARNING OBJECTIVES: 07.03 - Restrict data retrievals to rows that match complex criteria

30. A(n) _____ join will select only the rows with matching values in the common attribute(s).

a. natural b. outer
c. full d. cross

ANSWER: a
DIFFICULTY: Difficulty: Moderate
REFERENCES: 7-4a Natural Join
LEARNING OBJECTIVES: 07.03 - Restrict data retrievals to rows that match complex criteria

31. If a designer wishes to create an inner join, but the two tables do not have a commonly named attribute, he can use a(n) _____ clause.

a. OF b. USING
c. HAS d. JOIN ON

ANSWER: d
DIFFICULTY: Difficulty: Easy
REFERENCES: 7-4c JOIN ON Syntax
LEARNING OBJECTIVES: 07.03 - Restrict data retrievals to rows that match complex criteria

32. A(n) _____ join returns not only the rows matching the join condition (that is, rows with matching values in the common columns) but also the rows with unmatched values.

a. outer b. inner
c. equi- d. cross

ANSWER: a
DIFFICULTY: Difficulty: Easy
REFERENCES: 7-4e Outer Joins
LEARNING OBJECTIVES: 07.03 - Restrict data retrievals to rows that match complex criteria

33. The syntax for a left outer join is _____.

a. SELECT column-list
FROM table1 OUTER JOIN table2 LEFT
WHERE join-condition

b. SELECT column-list
FROM table1 LEFT [OUTER] JOIN table2
ON join-condition

c. SELECT column-list
WHERE LEFT table1 = table

d. SELECT column-list
FROM table1 LEFT table2 [JOIN]
WHERE join-condition

ANSWER: b
DIFFICULTY: Difficulty: Moderate
REFERENCES: 7-4e Outer Joins
LEARNING OBJECTIVES: 07.03 - Restrict data retrievals to rows that match complex criteria

34. A(n) _____ join performs a relational product (also known as the Cartesian product) of two tables.
a. full b. cross
c. natural d. equi-

ANSWER: b
DIFFICULTY: Difficulty: Moderate
REFERENCES: 7-4f Cross Join
LEARNING OBJECTIVES: 07.03 - Restrict data retrievals to rows that match complex criteria

35. How many rows would be returned from a cross join of tables A and B, if A contains 8 rows and B contains 18?
a. 8 b. 18
c. 26 d. 144

ANSWER: d
DIFFICULTY: Difficulty: Moderate
REFERENCES: 7-4f Cross Join
LEARNING OBJECTIVES: 07.03 - Restrict data retrievals to rows that match complex criteria

36. Which comparison operator indicates a value is not equal?
a. < b. <=
c. >= d. <>

ANSWER: d
DIFFICULTY: Difficulty: Moderate
REFERENCES: 7-6a Selecting Rows with Conditional Restrictions
LEARNING OBJECTIVES: 07.03 - Restrict data retrievals to rows that match complex criteria

37. What type of command does this SQL statement use?

```
SELECT    P_CODE, P_DESCRIPT, P_PRICE_V_NAME
FROM      PRODUCT, VENDOR
WHERE     PRODUCT.V_CODE=VENDOR. V_CODE
```

a. set operator b. natural join
c. "old-style" join d. procedural statement

ANSWER: c
DIFFICULTY: Difficulty: Moderate
REFERENCES: 7-6e Old-Style Joins
LEARNING OBJECTIVES: 07.05 - Create subqueries to preprocess data for inclusion in other queries

38. The special operator used to check whether an attribute value is within a range of values is _____.
    a. BETWEEN b. NULL
    c. LIKE d. IN
ANSWER: a
DIFFICULTY: Difficulty: Easy
REFERENCES: 7-6f Special Operators
LEARNING OBJECTIVES: 07.03 - Restrict data retrievals to rows that match complex criteria

39. The special operator used to check whether an attribute value matches a given string pattern is _____.
    a. BETWEEN b. IS NULL
    c. LIKE d. IN
ANSWER: c
DIFFICULTY: Difficulty: Easy
REFERENCES: 7-6f Special Operators
LEARNING OBJECTIVES: 07.03 - Restrict data retrievals to rows that match complex criteria

40. The SQL aggregate function that gives the number of rows containing non-null values for a given column is _____.
    a. COUNT b. MIN
    c. MAX d. SUM
ANSWER: a
DIFFICULTY: Difficulty: Easy
REFERENCES: 7-7a Aggregate Functions
LEARNING OBJECTIVES: 07.04 - Aggregate data across groups of rows

41. A(n) _____ is a query that is embedded (or nested) inside another query.
    a. alias b. operator
    c. subquery d. view
ANSWER: c
DIFFICULTY: Difficulty: Easy
REFERENCES: 7-8 Subqueries
LEARNING OBJECTIVES: 07.05 - Create subqueries to preprocess data for inclusion in other queries

42. In subquery terminology, the first query in the SQL statement is known as the _____ query.
    a. outer b. left
    c. inner d. base
ANSWER: a
DIFFICULTY: Difficulty: Easy
REFERENCES: 7-8 Subqueries
LEARNING OBJECTIVES: 07.05 - Create subqueries to preprocess data for inclusion in other queries

43. The special operator used to check whether a subquery returns any rows is _____.
    a. BETWEEN b. EXISTS
    c. LIKE d. IN
ANSWER: b
DIFFICULTY: Difficulty: Easy

REFERENCES: 7-8g Correlated Subqueries
LEARNING OBJECTIVES: 07.05 - Create subqueries to preprocess data for inclusion in other queries

44. Which is a feature of a correlated subquery?
a. The inner subquery executes first.
b. The outer subquery initiates the process of execution in a subquery.
c. The inner subquery initiates the process of execution in a subquery.
d. The outer subquery executes independent of the inner subquery.
ANSWER: b
DIFFICULTY: Difficulty: Easy
REFERENCES: 7-8g Correlated Subqueries
LEARNING OBJECTIVES: 07.05 - Create subqueries to preprocess data for inclusion in other queries

45. The _____ function returns the current system date in MS Access.
a. TO_DATE() b. SYSDATE()
c. DATE() d. TODAY()
ANSWER: c
DIFFICULTY: Difficulty: Easy
REFERENCES: 7-9a Date and Time Functions
LEARNING OBJECTIVES: 07.06 - Identify and use a variety of SQL functions for string, numeric, and date manipulation

46. When using the Oracle TO_DATE function, the code _____ represents a three-letter month name.
a. MON b. MM3
c. MONTH d. MM
ANSWER: a
DIFFICULTY: Difficulty: Easy
REFERENCES: 7-9a Date and Time Functions
LEARNING OBJECTIVES: 07.06 - Identify and use a variety of SQL functions for string, numeric, and date manipulation

47. _____ is a string function that returns the number of characters in a string value.
a. LENGTH b. SUBSTRING
c. CONCAT d. UCASE
ANSWER: a
DIFFICULTY: Difficulty: Easy
REFERENCES: 7-9c String Functions
LEARNING OBJECTIVES: 07.06 - Identify and use a variety of SQL functions for string, numeric, and date manipulation

48. The Oracle _____ function compares an attribute or expression with a series of values and returns an associated value or a default value if no match is found.
a. NVL b. TO_CHAR
c. DECODE d. CONVERT
ANSWER: c
DIFFICULTY: Difficulty: Easy
REFERENCES: 7-9c String Functions
LEARNING OBJECTIVES: 07.06 - Identify and use a variety of SQL functions for string, numeric, and date manipulation

49. In Oracle, the _____ function converts a date to a character string.
a. CONVERT() b. TO_DATE
c. TO_CHAR() d. TO_STRING()
ANSWER: c
DIFFICULTY: Difficulty: Easy
REFERENCES: 7-9d Conversion Functions
LEARNING OBJECTIVES: 07.06 - Identify and use a variety of SQL functions for string, numeric, and date manipulation

50. _____ is a relational set operator.
a. EXCEPT b. PLUS
c. ALL d. EXISTS
ANSWER: a
DIFFICULTY: Difficulty: Easy
REFERENCES: 7-10 Relational Set Operators
LEARNING OBJECTIVES: 07.06 - Identify and use a variety of SQL functions for string, numeric, and date manipulation

Completion

51. The basic SQL vocabulary has fewer than _____words.
ANSWER: 100
one hundred
a hundred
DIFFICULTY: Difficulty: Easy
REFERENCES: 7-1 Introduction to SQL
LEARNING OBJECTIVES: 07.01 - Retrieve specified columns of data from a database

52. The _____ specification is used to avoid having duplicated values in a column.
ANSWER: UNIQUE
DIFFICULTY: Difficulty: Easy
REFERENCES: 7-1 Introduction to SQL
LEARNING OBJECTIVES: 07.01 - Retrieve specified columns of data from a database

53. In the SQL environment, the word _____ covers both questions and actions.
ANSWER: query
DIFFICULTY: Difficulty: Easy
REFERENCES: 7-1b SQL Queries
LEARNING OBJECTIVES: 07.01 - Retrieve specified columns of data from a database

54. A(n) _____ character is a symbol that can be used as a general substitute for other characters or commands.
ANSWER: wildcard
wild card
DIFFICULTY: Difficulty: Easy
REFERENCES: 7-3 SELECT Statement Options
LEARNING OBJECTIVES: 07.02 - Join multiple tables in a single SQL query

55. The _____ condition is generally composed of an equality comparison between the foreign key and the primary key of

related tables.
ANSWER: join
DIFFICULTY: Difficulty: Easy
REFERENCES: 7-4 FROM Clause Options
LEARNING OBJECTIVES: 07.03 - Restrict data retrievals to rows that match complex criteria

56. A(n) _____ order sequence is a multilevel ordered sequence that can be created easily by listing several attributes, separated by commas, after the ORDER BY clause.
ANSWER: cascading
DIFFICULTY: Difficulty: Easy
REFERENCES: 7-5 ORDER BY Clause Options
LEARNING OBJECTIVES: 07.03 - Restrict data retrievals to rows that match complex criteria

57. An alias is especially useful when a table must be joined to itself in a(n) _____ query.
ANSWER: recursive
DIFFICULTY: Difficulty: Easy
REFERENCES: 7-4h Recursive Joins
LEARNING OBJECTIVES: 07.03 - Restrict data retrievals to rows that match complex criteria

58. The _____ command, coupled with appropriate search conditions, is an incredibly powerful tool that enables a user to transform data into information.
ANSWER: SELECT
DIFFICULTY: Difficulty: Easy
REFERENCES: 7-6 WHERE Clause Options
LEARNING OBJECTIVES: 07.03 - Restrict data retrievals to rows that match complex criteria

59. A specialty field in mathematics, known as _____ algebra, is dedicated to the use of logical operators.
ANSWER: Boolean
DIFFICULTY: Difficulty: Easy
REFERENCES: 7-6d Logical Operators: AND, OR, and NOT
LEARNING OBJECTIVES: 07.03 - Restrict data retrievals to rows that match complex criteria

60. In SQL, all _____ expressions evaluate to true or false.
ANSWER: conditional
DIFFICULTY: Difficulty: Easy
REFERENCES: 7-6d Logical Operators: AND, OR, and NOT
LEARNING OBJECTIVES: 07.03 - Restrict data retrievals to rows that match complex criteria

61. Rows can be grouped into smaller collections quickly and easily using the _____ clause within the SELECT statement.
ANSWER: GROUP BY
DIFFICULTY: Difficulty: Easy
REFERENCES: 7-7b Grouping Data
LEARNING OBJECTIVES: 07.04 - Aggregate data across groups of rows

62. The _____ clause of the GROUP BY statement operates very much like the WHERE clause in the SELECT statement.

ANSWER: HAVING
DIFFICULTY: Difficulty: Easy
REFERENCES: 7-7c HAVING Clause
LEARNING OBJECTIVES: 07.04 - Aggregate data across groups of rows

63. A(n) _____, also known as a nested query or an inner query, is a query that is embedded (or nested) inside another query.
ANSWER: subquery
DIFFICULTY: Difficulty: Easy
REFERENCES: 7-8 Subqueries
LEARNING OBJECTIVES: 07.05 - Create subqueries to preprocess data for inclusion in other queries

64. DATE() and SYSDATE are special functions that return today's date in MS Access and _____, respectively.
ANSWER: Oracle
DIFFICULTY: Difficulty: Easy
REFERENCES: 7-9a Date and Time Functions
LEARNING OBJECTIVES: 07.06 - Identify and use a variety of SQL functions for string, numeric, and date manipulation

65. _____ functions allow you to take a value of a given data type and convert it to the equivalent value in another data type.
ANSWER: Conversion
DIFFICULTY: Difficulty: Easy
REFERENCES: 7-9d Conversion Functions
LEARNING OBJECTIVES: 07.06 - Identify and use a variety of SQL functions for string, numeric, and date manipulation

66. "_____" means that the names of the relation attributes must be the same and their data types must be alike.
ANSWER: Union-compatible
DIFFICULTY: Difficulty: Easy
REFERENCES: 7-10 Relational Set Operators
LEARNING OBJECTIVES: 07.06 - Identify and use a variety of SQL functions for string, numeric, and date manipulation

67. The _____ statement in SQL combines rows from two queries and returns only the rows that appear in the first set but not in the second.
ANSWER: EXCEPT
DIFFICULTY: Difficulty: Easy
REFERENCES: 7-10 Relational Set Operators
LEARNING OBJECTIVES: 07.06 - Identify and use a variety of SQL functions for string, numeric, and date manipulation

68. The _____ operator could be used in place of INTERSECT if the DBMS does not support it.
ANSWER: IN
DIFFICULTY: Difficulty: Easy
REFERENCES: 7-10e Syntax Alternatives
LEARNING OBJECTIVES: 07.06 - Identify and use a variety of SQL functions for string, numeric, and date manipulation

69. The _____ operator could be used in place of EXCEPT (MINUS) if the DBMS does not support it.
ANSWER: NOT IN

DIFFICULTY: Difficulty: Easy
REFERENCES: 7-10 Relational Set Operators
LEARNING OBJECTIVES: 07.06 - Identify and use a variety of SQL functions for string, numeric, and date manipulation

70. The syntax of the EXCEPT statement in Oracle is _____.
ANSWER: *query* EXCEPT *query*
DIFFICULTY: Difficulty: Easy
REFERENCES: 7-10d Except (Minus)
LEARNING OBJECTIVES: 07.06 - Identify and use a variety of SQL functions for string, numeric, and date manipulation

Essay

71. Explain the SQL function categories.
ANSWER:

- SQL functions fit into several broad categories:

1. Data definition language (DDL): it includes commands to create database objects such as tables, indexes, and views, as well as commands to define access rights to those databases objects.
2. Data manipulation language (DML): it includes commands to insert, update, delete, and retrieve data within the database tables.
3. Transaction control language (TCL): the DML commands in SQL are executed within the context of a transaction, which is a logical unit of work composed of one or more SQL statements, as defined by business rules (see Chapter 10, Transaction Management and Concurrency Control). SQL provides commands to control the processing of these statements an indivisible unit of work. These will be discussed in Chapter 8, after you learn about the DML commands that compose a transaction.
4. Data control language (DCL): data control commands are used to control access to data objects, such as giving a one user permission to only view the PRODUCT table, and giving another use permission to change the data in the PRODUCT table.

DIFFICULTY: Difficulty: Moderate
REFERENCES: 7-1 Introduction to SQL
LEARNING OBJECTIVES: 07.01 - Retrieve specified columns of data from a database

72. What are the wildcard characters that are used with the LIKE command? Provide one or more examples of each.
ANSWER: The LIKE special operator is used in conjunction with wildcards to find patterns within string attributes. Standard SQL allows a user to use the percentage sign (%) and underscore (_) wildcard characters to make matches when the entire string is not known:
% means any and all *following* or *preceding* characters are eligible.

For example:
'J%' includes Johnson, Jones, Jernigan, July, and J-231Q.

'Jo%' includes Johnson and Jones.
'%n' includes Johnson and Jernigan.
_ means any *one* character may be substituted for the underscore.

For example:
'_23-456-6789' includes 123-456-6789, 223-456-6789, and 323-456-6789.
'_23-_56-678_' includes 123-156-6781, 123-256-6782, and 823-956-6788.
'_o_es' includes Jones, Cones, Cokes, totes, and roles.

DIFFICULTY: Difficulty: Moderate

REFERENCES: 7-6f Special Operators

LEARNING OBJECTIVES: 07.03 - Restrict data retrievals to rows that match complex criteria

73. What is a subquery? What is always executed first?

ANSWER: A subquery, also known as a nested query or an inner query, is a query that is embedded (or nested) inside another query. The inner query is always executed first by the RDBMS.

DIFFICULTY: Difficulty: Moderate

REFERENCES: 7-8 Subqueries

LEARNING OBJECTIVES: 07.05 - Create subqueries to preprocess data for inclusion in other queries

74. What are the four different types of results that can be returned from a subquery?

ANSWER: A subquery can return one or more values.

One single value (one column and one row):
This subquery is used anywhere a single value is expected, as in the right side of a comparison expression. An example is the preceding UPDATE subquery, in which an average price is assigned to the product's price. When a value is assigned to an attribute, a single value is assigned and not a list of them. Therefore, the subquery must return only one value (one column, one row). If the query returns multiple values, the DBMS generates an error.

A list of values (one column and multiple rows):
This type of subquery is used anywhere a list of values is expected, such as when using the IN clause—for example, when comparing the vendor code to a list of vendors. Again, in this case, there is only one column of data with multiple value instances. This type of subquery is used frequently in combination with the IN operator in a WHERE conditional expression.

A virtual table (multicolumn, multirow set of values):
This type of subquery can be used anywhere a table is expected, such as when using the FROM clause.

The fourth result that a subquery can return is no value at all. It is called NULL.

DIFFICULTY: Difficulty: Moderate

REFERENCES: 7-8 Subqueries

LEARNING OBJECTIVES: 07.05 - Create subqueries to preprocess data for inclusion in other queries

75. Describe the important features and applications of SQL functions.

ANSWER: SQL functions are very useful tools. Functions always use a numerical, date, or string value. The value may be part of the command itself (a constant or literal) or it may be an attribute located in a table. Therefore, a function may appear anywhere in a SQL statement where a value or an attribute can be used. There are many types of SQL functions, such as arithmetic, trigonometric, string, date, and time functions.

These functions are useful when all employees need to be ordered by year of birth, or when a marketing department wants to generate a list of all customers ordered by zip code and the first three digits of their telephone numbers. In both of these cases, data elements that are not present as such in the database will be required; instead, an SQL function that can be derived from an existing attribute is required.

DIFFICULTY: Difficulty: Moderate

REFERENCES: 7-9 SQL Functions

LEARNING OBJECTIVES: 07.06 - Identify and use a variety of SQL functions for string, numeric, and date manipulation

Chapter 08: Advanced SQL

True / False

1. A view is a virtual table based on a SELECT query.
   a. True
   b. False

ANSWER: True
DIFFICULTY: Difficulty: Easy
REFERENCES: 8-5 Virtual Tables: Creating a View
LEARNING OBJECTIVES: 08.05 - Use SQL to create database views, including updatable views

2. A sequence is not associated with a table and can be dropped from a database with a DROP SEQUENCE command.
   a. True
   b. False

ANSWER: True
DIFFICULTY: Difficulty: Easy
REFERENCES: 8-6 Sequences
LEARNING OBJECTIVES: 08.05 - Use SQL to create database views, including updatable views

3. To remedy the lack of procedural functionality in SQL, and to provide some standardization within the many vendor offerings, the SQL-99 standard defined the use of persistent stored modules.
   a. True
   b. False

ANSWER: True
DIFFICULTY: Difficulty: Easy
REFERENCES: 8-7 Procedural SQL
LEARNING OBJECTIVES: 08.06 - Use Procedural Language SQL (PL/SQL) to create triggers, stored procedures, and PL/SQL functions

4. SQL supports the conditional execution of procedures (IF-THEN-ELSE statements) that are typically supported by a programming language.
   a. True
   b. False

ANSWER: False
DIFFICULTY: Difficulty: Moderate
REFERENCES: 8-7 Procedural SQL
LEARNING OBJECTIVES: 08.06 - Use Procedural Language SQL (PL/SQL) to create triggers, stored procedures, and PL/SQL functions

5. A persistent stored module is stored and executed on the database client machine.
   a. True
   b. False

ANSWER: False
DIFFICULTY: Difficulty: Easy
REFERENCES: 8-7 Procedural SQL
LEARNING OBJECTIVES: 08.06 - Use Procedural Language SQL (PL/SQL) to create triggers, stored procedures, and PL/SQL functions

6. Every PL/SQL block must be given a name.

a. True

b. False

ANSWER: False

DIFFICULTY: Difficulty: Easy

REFERENCES: 8-7 Procedural SQL

LEARNING OBJECTIVES: 08.06 - Use Procedural Language SQL (PL/SQL) to create triggers, stored procedures, and PL/SQL functions

7. In Oracle, you can use the SQL*Plus command SHOW ERRORS to help you diagnose errors found in PL/SQL blocks.

a. True

b. False

ANSWER: True

DIFFICULTY: Difficulty: Moderate

REFERENCES: 8-7 Procedural SQL

LEARNING OBJECTIVES: 08.06 - Use Procedural Language SQL (PL/SQL) to create triggers, stored procedures, and PL/SQL functions

8. The most useful feature of PL/SQL blocks is that they let a designer create code that can be named, stored, and executed by the DBMS.

a. True

b. False

ANSWER: True

DIFFICULTY: Difficulty: Easy

REFERENCES: 8-7 Procedural SQL

LEARNING OBJECTIVES: 08.06 - Use Procedural Language SQL (PL/SQL) to create triggers, stored procedures, and PL/SQL functions

9. Automating business procedures and automatically maintaining data integrity and consistency are trivial in a modern business environment.

a. True

b. False

ANSWER: False

DIFFICULTY: Difficulty: Easy

REFERENCES: 8-7a Triggers

LEARNING OBJECTIVES: 08.06 - Use Procedural Language SQL (PL/SQL) to create triggers, stored procedures, and PL/SQL functions

10. The DECLARE section in the trigger is used to declare any variables used inside the trigger code.

a. True

b. False

ANSWER: True

DIFFICULTY: Difficulty: Easy

REFERENCES: 8-7a Triggers

LEARNING OBJECTIVES: 08.06 - Use Procedural Language SQL (PL/SQL) to create triggers, stored procedures, and

PL/SQL functions

11. A trigger is procedural SQL code that is automatically invoked by the RDBMS upon the occurrence of a given data manipulation event.

a. True

b. False

ANSWER: True

DIFFICULTY: Difficulty: Easy

REFERENCES: 8-7a Triggers

LEARNING OBJECTIVES: 08.06 - Use Procedural Language SQL (PL/SQL) to create triggers, stored procedures, and PL/SQL functions

12. Triggers can only be used to update table values.

a. True

b. False

ANSWER: False

DIFFICULTY: Difficulty: Easy

REFERENCES: 8-7a Triggers

LEARNING OBJECTIVES: 08.06 - Use Procedural Language SQL (PL/SQL) to create triggers, stored procedures, and PL/SQL functions

13. A statement-level trigger is assumed if a designer omits the FOR EACH ROW keywords.

a. True

b. False

ANSWER: True

DIFFICULTY: Difficulty: Easy

REFERENCES: 8-7a Triggers

LEARNING OBJECTIVES: 08.06 - Use Procedural Language SQL (PL/SQL) to create triggers, stored procedures, and PL/SQL functions

14. A row-level trigger is assumed if we omit the FOR EACH ROW keywords and a statement-level trigger required the use of the FOR EACH ROW keyword.

a. True

b. False

ANSWER: False

DIFFICULTY: Difficulty: Moderate

REFERENCES: 8-7a Triggers

LEARNING OBJECTIVES: 08.06 - Use Procedural Language SQL (PL/SQL) to create triggers, stored procedures, and PL/SQL functions

15. MySQL allows multiple triggering conditions per trigger.

a. True

b. False

ANSWER: False

DIFFICULTY: Difficulty: Easy

REFERENCES: 8-7a Triggers

LEARNING OBJECTIVES: 08.06 - Use Procedural Language SQL (PL/SQL) to create triggers, stored procedures, and PL/SQL functions

16. BEFORE means before the changes are made in memory but after the changes are permanently saved to disk.
    a. True
    b. False

ANSWER: False
DIFFICULTY: Difficulty: Easy
REFERENCES: 8-7a Triggers
LEARNING OBJECTIVES: 08.06 - Use Procedural Language SQL (PL/SQL) to create triggers, stored procedures, and PL/SQL functions

17. Just like database triggers, stored procedures are stored in the database.
    a. True
    b. False

ANSWER: True
DIFFICULTY: Difficulty: Easy
REFERENCES: 8-7b Stored Procedures
LEARNING OBJECTIVES: 08.06 - Use Procedural Language SQL (PL/SQL) to create triggers, stored procedures, and PL/SQL functions

18. One of the major advantages of stored procedures is that they can be used to encapsulate and represent business transactions.
    a. True
    b. False

ANSWER: True
DIFFICULTY: Difficulty: Easy
REFERENCES: 8-7b Stored Procedures
LEARNING OBJECTIVES: 08.06 - Use Procedural Language SQL (PL/SQL) to create triggers, stored procedures, and PL/SQL functions

19. Stored procedures must have at least one argument.
    a. True
    b. False

ANSWER: False
DIFFICULTY: Difficulty: Moderate
REFERENCES: 8-7b Stored Procedures
LEARNING OBJECTIVES: 08.06 - Use Procedural Language SQL (PL/SQL) to create triggers, stored procedures, and PL/SQL functions

20. An explicit cursor must return two or more rows.
    a. True
    b. False

ANSWER: False
DIFFICULTY: Difficulty: Easy
REFERENCES: 8-7c PL/SQL Processing with Cursors

LEARNING OBJECTIVES: 08.06 - Use Procedural Language SQL (PL/SQL) to create triggers, stored procedures, and PL/SQL functions

Multiple Choice

21. When you create a new database, the RDBMS automatically creates the data _____ tables in which to store the metadata and creates a default database administrator.

a. index b. chapter
c. dictionary d. appendix

ANSWER: c
DIFFICULTY: Difficulty: Easy
REFERENCES: 8-1b Creating the Database
LEARNING OBJECTIVES: 08.01 - Use SQL to create a table manually

22. Which SQL format would be best used for a small, numeric data type?

a. INTEGER b. SMALLINT
c. NUMERIC(L,D) d. CHAR(L)

ANSWER: b
DIFFICULTY: Difficulty: Moderate
REFERENCES: 8-1d Data Types
LEARNING OBJECTIVES: 08.01 - Use SQL to create a table manually

23. When writing SQL table-creating command sequences, the entire table definition is enclosed in _____.

a. asterisks b. commas
c. quotations d. parentheses

ANSWER: d
DIFFICULTY: Difficulty: Easy
REFERENCES: 8-2a CREATE TABLE command
LEARNING OBJECTIVES: 08.01 - Use SQL to create a table manually

24. The _____ specification creates an individual index on a respective attribute; use it to avoid having duplicated values in a column.

a. UNIQUE b. NOT NULL
c. UPDATE d. VARCHAR

ANSWER: a
DIFFICULTY: Difficulty: Easy
REFERENCES: 8-2a CREATE TABLE command
LEARNING OBJECTIVES: 08.01 - Use SQL to create a table manually

25. Words used by a system that cannot be used for any other purpose are called _____ words. For example, in Oracle SQL, the word INITIAL cannot be used to name tables or columns.

a. reserved b. unique
c. null d. character

ANSWER: a
DIFFICULTY: Difficulty: Easy
REFERENCES: 8-2a CREATE TABLE command

LEARNING OBJECTIVES: 08.01 - Use SQL to create a table manually

26. You cannot have an invalid entry in the foreign key column; at the same time, you cannot delete a vendor row as long as a product row references that vendor. This is known as _____.

a. batch updating b. referential integrity
c. authentication d. cross joining

ANSWER: b
DIFFICULTY: Difficulty: Easy
REFERENCES: 8-2a CREATE TABLE command
LEARNING OBJECTIVES: 08.01 - Use SQL to create a table manually

27. The _____ constraint assigns a value to an attribute when a new row is added to a table.

a. NOT NULL b. CASCADE
c. UNIQUE d. DEFAULT

ANSWER: d
DIFFICULTY: Difficulty: Easy
REFERENCES: 8-2b SQL Constraints
LEARNING OBJECTIVES: 08.01 - Use SQL to create a table manually

28. The _____ constraint is used to validate data when an attribute value is entered.

a. UNIQUE b. CASCADE
c. CHECK d. SET NULL

ANSWER: c
DIFFICULTY: Difficulty: Easy
REFERENCES: 8-2b SQL Constraints
LEARNING OBJECTIVES: 08.01 - Use SQL to create a table manually

29. The CREATE TABLE command lets you define constraints when you use the CONSTRAINT keyword, known as a(n) _____ constraint.

a. column b. table
c. index d. cell

ANSWER: b
DIFFICULTY: Difficulty: Easy
REFERENCES: 8-2b SQL Constraints
LEARNING OBJECTIVES: 08.01 - Use SQL to create a table manually

30. Using the _____ command, SQL indexes can be created on the basis of any selected attribute.

a. CREATE INDEX b. UPDATE CASCADE
c. SELECT d. VARCHAR

ANSWER: a
DIFFICULTY: Difficulty: Easy
REFERENCES: 8-2d SQL Indexes
LEARNING OBJECTIVES: 08.01 - Use SQL to create a table manually

31. All changes in a table structure are made using the _____ TABLE command, followed by a keyword that produces the specific changes a user wants to make.

a. ALTER b. COMMIT
c. UPDATE d. ROLLBACK

ANSWER: a
DIFFICULTY: Difficulty: Easy
REFERENCES: 8-3 Altering Table Structures
LEARNING OBJECTIVES: 08.03 - Manipulate the structure of existing tables to add, modify, and remove columns and constraints

32. A table can be deleted from the database by using the _____ TABLE command.
a. DROP b. DELETE
c. MODIFY d. ERASE

ANSWER: a
DIFFICULTY: Difficulty: Easy
REFERENCES: 8-3e Deleting a Table from the Database
LEARNING OBJECTIVES: 08.03 - Manipulate the structure of existing tables to add, modify, and remove columns and constraints

33. SQL requires the use of the _____ command to enter data into a table.
a. INSERT b. SELECT
c. COMMIT d. NOT NULL

ANSWER: a
DIFFICULTY: Difficulty: Easy
REFERENCES: 8-4a Adding Table Rows
LEARNING OBJECTIVES: 08.04 - Use SQL to do data manipulation (insert, update, and delete rows of data)

34. The _____ command permanently saves all changes—such as rows added, attributes modified, and rows deleted—made to any table in the database.
a. COMMIT b. SELECT
c. ROLLBACK d. UPDATE

ANSWER: a
DIFFICULTY: Difficulty: Easy
REFERENCES: 8-4c Saving Table Changes
LEARNING OBJECTIVES: 08.04 - Use SQL to do data manipulation (insert, update, and delete rows of data)

35. Which command would be used to delete the table row where the P_CODE is 'BRT-345'?
a. DELETE FROM PRODUCT WHERE P_CODE = 'BRT-345';
b. REMOVE FROM PRODUCT WHERE P_CODE = 'BRT-345';
c. ERASE FROM PRODUCT WHERE P_CODE = 'BRT-345';
d. ROLLBACK FROM PRODUCT WHERE P_CODE = 'BRT-345';

ANSWER: a
DIFFICULTY: Difficulty: Moderate
REFERENCES: 8-4e Deleting Table Rows
LEARNING OBJECTIVES: 08.04 - Use SQL to do data manipulation (insert, update, and delete rows of data)

36. When a user issues the DELETE FROM tablename command without specifying a WHERE condition, _____.
a. no rows will be deleted b. the first row will be deleted

c. the last row will be deleted d. all rows will be deleted

ANSWER: d
DIFFICULTY: Difficulty: Easy
REFERENCES: 8-4e Deleting Table Rows
LEARNING OBJECTIVES: 08.04 - Use SQL to do data manipulation (insert, update, and delete rows of data)

37. The _____ command is used to restore the database to its previous condition.
a. ROWCOUNT b. BACKUP
c. COMMIT d. ROLLBACK

ANSWER: d
DIFFICULTY: Difficulty: Easy
REFERENCES: 8-4f Restoring Table Contents
LEARNING OBJECTIVES: 08.04 - Use SQL to do data manipulation (insert, update, and delete rows of data)

38. The tables on which a view, or a virtual table derived from a SELECT query, are based are called _____ tables.
a. indexed b. core
c. relation d. base

ANSWER: d
DIFFICULTY: Difficulty: Easy
REFERENCES: 8-5 Virtual Tables: Creating a View
LEARNING OBJECTIVES: 08.05 - Use SQL to create database views, including updatable views

39. The Oracle equivalent to an MS Access AutoNumber is a(n) _____.
a. auto-number b. sequence
c. TO_NUMBER function d. trigger

ANSWER: b
DIFFICULTY: Difficulty: Easy
REFERENCES: 8-6 Sequences
LEARNING OBJECTIVES: 08.05 - Use SQL to create database views, including updatable views

40. Which statement describes a feature of Oracle sequences?
a. Oracle sequences are tied to columns and tables.
b. Oracle sequences generate a character string that can be assigned to tables.
c. An Oracle sequence uses the identity column property to automatically number rows.
d. Dropping a sequence does not delete values assigned to table attributes; it deletes only the sequence object from the database.

ANSWER: d
DIFFICULTY: Difficulty: Easy
REFERENCES: 8-6 Sequences
LEARNING OBJECTIVES: 08.05 - Use SQL to create database views, including updatable views

41. The _____ pseudo-column is used to select the next value from a sequence.
a. CURRVAL b. NEXTVAL
c. NEXT d. GET_NEXT

ANSWER: b

DIFFICULTY: Difficulty: Easy
REFERENCES: 8-6 Sequences
LEARNING OBJECTIVES: 08.05 - Use SQL to create database views, including updatable views

42. In Oracle, _____ retrieves the current value of a sequence.
a. NEXTVAL b. CURRVAL
c. VARCHAR d. VARCHAR2
ANSWER: b
DIFFICULTY: Difficulty: Easy
REFERENCES: 8-6 Sequences
LEARNING OBJECTIVES: 08.05 - Use SQL to create database views, including updatable views

43. In Oracle, _____ make(s) it possible to merge SQL and traditional programming constructs, such as variables, conditional processing (IF-THEN-ELSE), basic loops (FOR and WHILE loops,) and error trapping.
a. dynamic SQL b. stored procedures
c. embedded SQL d. Procedural Language SQL
ANSWER: d
DIFFICULTY: Difficulty: Easy
REFERENCES: 8-7 Procedural SQL
LEARNING OBJECTIVES: 08.06 - Use Procedural Language SQL (PL/SQL) to create triggers, stored procedures, and PL/SQL functions

44. A _____ is a block of code containing standard SQL statements and procedural extensions that is stored and executed at the DBMS server.
a. cursor-style process b. statement-level trigger
c. base table d. persistent storage module (PSM)
ANSWER: d
DIFFICULTY: Difficulty: Easy
REFERENCES: 8-7 Procedural SQL
LEARNING OBJECTIVES: 08.06 - Use Procedural Language SQL (PL/SQL) to create triggers, stored procedures, and PL/SQL functions

45. The PL/SQL block starts with the _____ section.
a. IS b. OPEN
c. DECLARE d. BEGIN
ANSWER: c
DIFFICULTY: Difficulty: Moderate
REFERENCES: 8-7 Procedural SQL
LEARNING OBJECTIVES: 08.06 - Use Procedural Language SQL (PL/SQL) to create triggers, stored procedures, and PL/SQL functions

46. The Oracle string concatenation function is _____.
a. CONCAT b. +
c. || d. &&
ANSWER: c
DIFFICULTY: Difficulty: Easy

REFERENCES: 8-7 Procedural SQL
LEARNING OBJECTIVES: 08.06 - Use Procedural Language SQL (PL/SQL) to create triggers, stored procedures, and PL/SQL functions

47. Oracle recommends _____ for creating audit logs.
a. triggers b. stored procedures
c. stored functions d. tables
ANSWER: a
DIFFICULTY: Difficulty: Easy
REFERENCES: 8-7a Triggers
LEARNING OBJECTIVES: 08.06 - Use Procedural Language SQL (PL/SQL) to create triggers, stored procedures, and PL/SQL functions

48. A(n) _____ cursor is automatically created in procedural SQL when the SQL statement returns only one value.
a. implicit b. dynamic
c. explicit d. static
ANSWER: a
DIFFICULTY: Difficulty: Easy
REFERENCES: 8-7c PL/SQL Processing with Cursors
LEARNING OBJECTIVES: 08.06 - Use Procedural Language SQL (PL/SQL) to create triggers, stored procedures, and PL/SQL functions

49. _____ is a cursor attribute that returns TRUE if the last FETCH returned a row, and FALSE if not.
a. %ROWCOUNT b. %NOTFOUND
c. %FOUND d. %ISOPEN
ANSWER: c
DIFFICULTY: Difficulty: Moderate
REFERENCES: 8-7c PL/SQL Processing with Cursors
LEARNING OBJECTIVES: 08.06 - Use Procedural Language SQL (PL/SQL) to create triggers, stored procedures, and PL/SQL functions

50. No matter what language you use, if it contains embedded SQL statements, it is called the _____ language.
a. base b. static
c. host d. view
ANSWER: c
DIFFICULTY: Difficulty: Easy
REFERENCES: 8-8 Embedded SQL
LEARNING OBJECTIVES: 08.07 - Create embedded SQL

Completion

51. A(n) _____-length character data type, like VARCHAR, is typically specified with a maximum length.
ANSWER: variable
DIFFICULTY: Difficulty: Easy
REFERENCES: 8-1d Data Types
LEARNING OBJECTIVES: 08.01 - Use SQL to create a table manually

52. _____ is the process the DBMS uses to verify that only registered users access the database.
ANSWER: Authentication
DIFFICULTY: Difficulty: Easy
REFERENCES: 8-1b Creating the Database
LEARNING OBJECTIVES: 08.01 - Use SQL to create a table manually

53. A(n) _____ is a logical group of database objects, such as tables and indexes, that are related to each other.
ANSWER: schema
DIFFICULTY: Difficulty: Easy
REFERENCES: 8-1c The Database Schema
LEARNING OBJECTIVES: 08.01 - Use SQL to create a table manually

54. U.S. state abbreviations are always two characters, so _____(2) is a logical choice for the data type representing a state column.
ANSWER: CHAR
DIFFICULTY: Difficulty: Easy
REFERENCES: 8-1d Data Types
LEARNING OBJECTIVES: 08.01 - Use SQL to create a table manually

55. The SQL data type DATE stores date in the _____ date format.
ANSWER: Julian
DIFFICULTY: Difficulty: Easy
REFERENCES: 8-1d Data Types
LEARNING OBJECTIVES: 08.01 - Use SQL to create a table manually

56. To make the SQL code more _____, most SQL programmers use one line per column (attribute) definition.
ANSWER: readable
DIFFICULTY: Difficulty: Easy
REFERENCES: 8-2a CREATE TABLE command
LEARNING OBJECTIVES: 08.01 - Use SQL to create a table manually

57. In a 1:M relationship, a user must always create the table for the "_____" side first.
ANSWER: 1
one

DIFFICULTY: Difficulty: Easy
REFERENCES: 8-2a CREATE TABLE command
LEARNING OBJECTIVES: 08.01 - Use SQL to create a table manually

58. _____ words are words used by SQL to perform specific functions.
ANSWER: Reserved
DIFFICULTY: Difficulty: Easy
REFERENCES: 8-2a CREATE TABLE command
LEARNING OBJECTIVES: 08.01 - Use SQL to create a table manually

59. If the NOT NULL and UNIQUE specifications are not supported when using a command sequence, use _____

without the specifications.
ANSWER: PRIMARY KEY
DIFFICULTY: Difficulty: Moderate
REFERENCES: 8-2a CREATE TABLE command
LEARNING OBJECTIVES: 08.01 - Use SQL to create a table manually

60. A common practice is to create a(n) _____ on any field that is used as a search key, in comparison operations in a conditional expression, or when a user wants to list rows in a specific order.
ANSWER: index
DIFFICULTY: Difficulty: Easy
REFERENCES: 8-2d SQL Indexes
LEARNING OBJECTIVES: 08.01 - Use SQL to create a table manually

61. To delete an index, one must use the _____ command.
ANSWER: DROP INDEX
DIFFICULTY: Difficulty: Easy
REFERENCES: 8-2d SQL Indexes
LEARNING OBJECTIVES: 08.01 - Use SQL to create a table manually

62. If a user adds a new column to a table that already has rows, the existing rows will default to a value of _____ for the new column.
ANSWER: null
DIFFICULTY: Difficulty: Easy
REFERENCES: 8-3c Adding a Column
LEARNING OBJECTIVES: 08.03 - Manipulate the structure of existing tables to add, modify, and remove columns and constraints

63. A table can be deleted from the database by using the _____ command.
ANSWER: DROP TABLE
DIFFICULTY: Difficulty: Easy
REFERENCES: 8-3e Deleting a Table from the Database
LEARNING OBJECTIVES: 08.03 - Manipulate the structure of existing tables to add, modify, and remove columns and constraints

64. In an INSERT command, a user can indicate just the attributes that have required values by listing the _____ inside parentheses after the table name.
ANSWER: names
DIFFICULTY: Difficulty: Easy
REFERENCES: 8-4a Adding Table Rows
LEARNING OBJECTIVES: 08.03 - Manipulate the structure of existing tables to add, modify, and remove columns and constraints

65. A(n) _____ routine pools multiple transactions into a single batch to update a master table field in a single operation.
ANSWER: batch update
DIFFICULTY: Difficulty: Easy
REFERENCES: 8-5a Updatable Views

LEARNING OBJECTIVES: 08.05 - Use SQL to create database views, including updatable views

66. A(n) _____ view is a view that can be used to update attributes in the base table(s) that are used in the view.
ANSWER: updatable
DIFFICULTY: Difficulty: Easy
REFERENCES: 8-5a Updatable Views
LEARNING OBJECTIVES: 08.05 - Use SQL to create database views, including updatable views

67. In MS Access, a designer can use the _____ data type to define a column in his table that will be automatically populated with unique numeric values.
ANSWER: AutoNumber
DIFFICULTY: Difficulty: Moderate
REFERENCES: 8-6 Sequences
LEARNING OBJECTIVES: 08.05 - Use SQL to create database views, including updatable views

68. Using Oracle _____, a designer can write a PL/SQL code block by enclosing the commands inside BEGIN and END clauses.
ANSWER: SQL*Plus
DIFFICULTY: Difficulty: Easy
REFERENCES: 8-7 Procedural SQL
LEARNING OBJECTIVES: 08.06 - Use Procedural Language SQL (PL/SQL) to create triggers, stored procedures, and PL/SQL functions

69. A row-level trigger requires use of the _____ keywords and is executed once for each row affected by the triggering statement.
ANSWER: FOR EACH ROW
DIFFICULTY: Difficulty: Moderate
REFERENCES: 8-7a Triggers
LEARNING OBJECTIVES: 08.06 - Use Procedural Language SQL (PL/SQL) to create triggers, stored procedures, and PL/SQL functions

70. _____ is the term used to describe an environment in which the SQL statement is not known in advance and is generated at run time.
ANSWER: Dynamic SQL
DIFFICULTY: Difficulty: Easy
REFERENCES: 8-8 Embedded SQL
LEARNING OBJECTIVES: 08.07 - Create embedded SQL

Essay

71. What is a schema? How many schemas can be used in one database?
ANSWER: In the SQL environment, a schema is a logical group of database objects—such as tables and indexes—that are related to each other. Usually, the schema belongs to a single user or application. A single database can hold multiple schemas that belong to different users or applications. Schemas are useful in that they group tables by owner (or function) and enforce a first level of security by allowing each user to see only the tables that belong to that user.
DIFFICULTY: Difficulty: Moderate

REFERENCES: 8-1c The Database Schema
LEARNING OBJECTIVES: 08.01 - Use SQL to create a table manually

72. How can a table be deleted from the database? Provide an example.
ANSWER: A table can be deleted from the database using the DROP TABLE command. For example, a user can delete the PART table with the following command:

DROP TABLE PART;

The user can drop a table only if it is not the "one" side of any relationship. If the user tries to drop a table otherwise, the RDBMS will generate an error message indicating that a foreign key integrity violation has occurred.

DIFFICULTY: Difficulty: Moderate
REFERENCES: 8-3e Deleting a Table from the Database
LEARNING OBJECTIVES: 08.04 - Use SQL to do data manipulation (insert, update, and delete rows of data)

73. Which command is used to save changes to the database? What is the syntax for this command?
ANSWER: Any changes made to the table contents are not saved on disk until a user closes the database, closes the program he or she is using, or uses the COMMIT command. If the database is open and a power outage or some other interruption occurs before the user issues the COMMIT command, the user's changes will be lost and only the original table contents will be retained.

The COMMIT command permanently saves all changes—such as rows added, attributes modified, and rows deleted— made to any table in the database.

The syntax for the COMMIT command is:
COMMIT [WORK]

DIFFICULTY: Difficulty: Moderate
REFERENCES: 8-4c Saving Table Changes
LEARNING OBJECTIVES: 08.03 - Manipulate the structure of existing tables to add, modify, and remove columns and constraints

74. How are triggers critical to proper database operation and management?
ANSWER: - Triggers can be used to enforce constraints that cannot be enforced at the DBMS design and implementation levels.
- Triggers add functionality by automating critical actions and providing appropriate warnings and suggestions for remedial action. In fact, one of the most common uses for triggers is to facilitate the enforcement of referential integrity.
- Triggers can be used to update table values, insert records in tables, and call other stored procedures.

DIFFICULTY: Difficulty: Moderate
REFERENCES: 8-7a Triggers
LEARNING OBJECTIVES: 08.06 - Use Procedural Language SQL (PL/SQL) to create triggers, stored procedures, and PL/SQL functions

75. Summarize the hierarchy of steps involved in creating and running an executable program with embedded SQL statements.
ANSWER: While the steps required to create and execute a program consisting of embedded SQL statements vary from one programming language to another, the following steps are

considered as a general standard.

a) The programmer writes embedded SQL code within the host language instructions. The code follows the standard syntax required for host language and embedded SQL.

b) A preprocessor is used to transform the embedded SQL into specialized procedure calls that are DBMS-specific and language-specific. The preprocessor is provided by the DBMS vendor and is specific to the host language.

c) The program is compiled using the host language compiler. The compiler creates an object code module for the program containing the DBMS procedure calls.

d) The object code is linked to the respective library modules and generates the executable program. This process binds the DBMS procedure calls to the DBMS run-time libraries. Additionally, the binding process typically creates an “access plan” module that contains instructions to run the embedded code at run time.

e) The executable is run, and the embedded SQL statement retrieves data from the database.

DIFFICULTY: Difficulty: Moderate

REFERENCES: 8-8 Embedded SQL

LEARNING OBJECTIVES: 08.07 - Create embedded SQL

Chapter 14: Big Data and NoSQL

True / False

1. Lack of specificity is what leads to ambiguity in defining Big Data.
    a. True
    b. False

ANSWER: True
DIFFICULTY: Easy
REFERENCES: 14-1 Big Data
LEARNING OBJECTIVES: 14.01 - Explain the role of Big Data in modern business

2. For a data set to be considered Big Data, it must display only one of the 3 Vs (volume, velocity and variety).
    a. True
    b. False

ANSWER: False
DIFFICULTY: Easy
REFERENCES: 14-1 Big Data
LEARNING OBJECTIVES: 14.01 - Explain the role of Big Data in modern business

3. Scaling out is keeping the same number of systems, but migrating each system to a larger one.
    a. True
    b. False

ANSWER: False
DIFFICULTY: Easy
REFERENCES: 14-1a Volume
LEARNING OBJECTIVES: 14.01 - Explain the role of Big Data in modern business

4. In many ways, the issues associated with volume and velocity are the same.
    a. True
    b. False

ANSWER: True
DIFFICULTY: Moderate
REFERENCES: 14-1b Velocity
LEARNING OBJECTIVES: 14.01 - Explain the role of Big Data in modern business

5. The analysis of data to produce actionable results is feedback loop processing.
    a. True
    b. False

ANSWER: True
DIFFICULTY: Easy
REFERENCES: 14-1b Velocity
LEARNING OBJECTIVES: 14.01 - Explain the role of Big Data in modern business

6. Relational databases rely on unstructured data.
    a. True

b. False

ANSWER: False
DIFFICULTY: Moderate
REFERENCES: 14-1c Variety
LEARNING OBJECTIVES: 14.01 - Explain the role of Big Data in modern business

7. Big Data processing imposes a structure on the data as needed for applications as a part of retrieval and processing.
a. True
b. False

ANSWER: True
DIFFICULTY: Moderate
REFERENCES: 14-1c Variety
LEARNING OBJECTIVES: 14.01 - Explain the role of Big Data in modern business

8. The ability to graphically present data in a way that makes it understandable is the concept of value.
a. True
b. False

ANSWER: False
DIFFICULTY: Easy
REFERENCES: 14-1d Other Characteristics
LEARNING OBJECTIVES: 14.01 - Explain the role of Big Data in modern business

9. Characteristics that are important in working with data in the relational database model also apply to Big Data.
a. True
b. False

ANSWER: True
DIFFICULTY: Moderate
REFERENCES: 14-1d Other Characteristics
LEARNING OBJECTIVES: 14.01 - Explain the role of Big Data in modern business

10. Hadoop is a database that has become the de facto standard for most Big Data storage and processing.
a. True
b. False

ANSWER: True
DIFFICULTY: Easy
REFERENCES: 14-2 Hadoop
LEARNING OBJECTIVES: 14.03 - Explain how the core components of the Hadoop framework operate

11. Under the HDFS system, using a write-one, ready-many model simplifies concurrency issues.
a. True
b. False

ANSWER: True
DIFFICULTY: Easy
REFERENCES: 14-2a HDFS

LEARNING OBJECTIVES: 14.03 - Explain how the core components of the Hadoop framework operate

12. A block report is used to let the name node know that the data mode is still available.
    a. True
    b. False

ANSWER: False
DIFFICULTY: Easy
REFERENCES: 14-2a HDFS
LEARNING OBJECTIVES: 14.03 - Explain how the core components of the Hadoop framework operate

13. A reduce function takes a collection of key-value pairs with the same key value and summarizes them into a single result.
    a. True
    b. False

ANSWER: True
DIFFICULTY: Easy
REFERENCES: 14-2b MapReduce
LEARNING OBJECTIVES: 14.03 - Explain how the core components of the Hadoop framework operate

14. Hive is a good choice for jobs that require a small subset of data to be returned very quickly.
    a. True
    b. False

ANSWER: False
DIFFICULTY: Easy
REFERENCES: 14-2c Hadoop Ecosystem
LEARNING OBJECTIVES: 14.04 - Identify the major components of the Hadoop ecosystem

15. Flume is a tool for converting data back and forth between a relational database and the HDFS.
    a. True
    b. False

ANSWER: False
DIFFICULTY: Easy
REFERENCES: 14-2c Hadoop Ecosystem
LEARNING OBJECTIVES: 14.04 - Identify the major components of the Hadoop ecosystem

16. Most NoSQL products run only in a Linux or Unix environment.
    a. True
    b. False

ANSWER: True
DIFFICULTY: Easy
REFERENCES: 14-3 NoSQL
LEARNING OBJECTIVES: 14.05 - Summarize the four major approaches of the NoSQL data model and how they differ from the relational

17. Key-value and document databases are structurally similar.

a. True
b. False

ANSWER: True
DIFFICULTY: Easy
REFERENCES: 14-3b Document Databases
LEARNING OBJECTIVES: 14.05 - Summarize the four major approaches of the NoSQL data model and how they differ from the relational

18. A column family database is a NoSQL database model that organizes data in key-value pairs with keys mapped to a set of columns in the value component.

a. True
b. False

ANSWER: True
DIFFICULTY: Easy
REFERENCES: 14-3c Column-Oriented Databases
LEARNING OBJECTIVES: 14.05 - Summarize the four major approaches of the NoSQL data model and how they differ from the relational

19. Interest in graph databases can be tied to the area of social networks.

a. True
b. False

ANSWER: True
DIFFICULTY: Easy
REFERENCES: 14-3d Graph Databases
LEARNING OBJECTIVES: 14.05 - Summarize the four major approaches of the NoSQL data model and how they differ from the relational

20. The name, MongoDB, comes from the word humongous as its developers intended their new product to support extremely large data sets.

a. True
b. False

ANSWER: True
DIFFICULTY: Easy
REFERENCES: 14-5 Working with Document Databases Using MongoDB
LEARNING OBJECTIVES: 14.07 - Understand how to work with document databases using MongoDB

Multiple Choice

21. _____ is NOT one of the "3 Vs" of Big Data.

a. Volume b. Velocity
c. Validation d. Variety

ANSWER: c
DIFFICULTY: Easy
REFERENCES: 14-1 Big Data
LEARNING OBJECTIVES: 14.01 - Explain the role of Big Data in modern business

22. _____ is keeping the same number of systems, but migrating each system to a larger system.
    a. Clustering b. Scaling up
    c. Streaming d. Scaling out

ANSWER: b
DIFFICULTY: Easy
REFERENCES: 14-1a Volume
LEARNING OBJECTIVES: 14.01 - Explain the role of Big Data in modern business

23. _____ focuses on filtering data as it enters the system to determine which data to keep and which to discard.
    a. Scaling up b. Feedback loop processing
    c. Stream processing d. Scaling out

ANSWER: c
DIFFICULTY: Easy
REFERENCES: 14-1b Velocity
LEARNING OBJECTIVES: 14.01 - Explain the role of Big Data in modern business

24. A(n) _____ is a process or set of operations in a calculation.
    a. algorithm b. feedback loop
    c. stream d. structure

ANSWER: a
DIFFICULTY: Easy
REFERENCES: 14-1b Velocity
LEARNING OBJECTIVES: 14.01 - Explain the role of Big Data in modern business

25. Big Data _____.
    a. relies on the use of structured data b. captures data in whatever format it naturally exists
    c. relies on the use of unstructured data d. imposes a structure on data when it is captured

ANSWER: b
DIFFICULTY: Moderate
REFERENCES: 14-1c Variety
LEARNING OBJECTIVES: 14.01 - Explain the role of Big Data in modern business

26. In the context of Big Data, _____ relates to changes in meaning.
    a. variety b. variability
    c. veracity d. viability

ANSWER: b
DIFFICULTY: Easy
REFERENCES: 14-1d Other Characteristics
LEARNING OBJECTIVES: 14.01 - Explain the role of Big Data in modern business

27. In the context of Big Data, _____ refers to the trustworthiness of a set of data.
    a. value b. variability
    c. veracity d. viability

ANSWER: c
DIFFICULTY: Easy
REFERENCES: 14-1d Other Characteristics
LEARNING OBJECTIVES: 14.01 - Explain the role of Big Data in modern business

28. By default, Hadoop uses a replication factor of _____.
a. one b. two
c. three d. four
ANSWER: c
DIFFICULTY: Easy
REFERENCES: 14-2a HDFS
LEARNING OBJECTIVES: 14.03 - Explain how the core components of the Hadoop framework operate

29. Which of the following is NOT a key assumption of the Hadoop Distributed File System?
a. High volume b. Write many, read-once
c. Streaming access d. Fault-tolerance
ANSWER: b
DIFFICULTY: Easy
REFERENCES: 14-2a HDFS
LEARNING OBJECTIVES: 14.03 - Explain how the core components of the Hadoop framework operate

30. When using a HDFS, the _____ node creates new files by communicating with the _____ node.
a. client; name b. data; name
c. data; client d. host; client
ANSWER: a
DIFFICULTY: Moderate
REFERENCES: 14-2a HDFS
LEARNING OBJECTIVES: 14.03 - Explain how the core components of the Hadoop framework operate

31. When using a HDFS, a heartbeat is sent every _____ to notify the name node that the data mode is still available.
a. 3 hours b. 3 seconds
c. 6 hours d. 6 seconds
ANSWER: b
DIFFICULTY: Easy
REFERENCES: 14-2a HDFS
LEARNING OBJECTIVES: 14.03 - Explain how the core components of the Hadoop framework operate

32. When using MapReduce, a _____ function takes a collection and data and sorts and filters it into a set of key-value pairs.
a. reduce b. map
c. data d. block
ANSWER: b
DIFFICULTY: Easy
REFERENCES: 14-2b MapReduce

LEARNING OBJECTIVES: 14.03 - Explain how the core components of the Hadoop framework operate

33. When using MapReduce, best practices suggest that the number of mappers on a given node should be _____.
    a. 50 or less b. over 100 but less than 300
    c. 100 or less d. at least 300

ANSWER: c
DIFFICULTY: Easy
REFERENCES: 14-2b MapReduce
LEARNING OBJECTIVES: 14.03 - Explain how the core components of the Hadoop framework operate

34. _____ processing occurs when a program runs from beginning to end without any user interaction.
    a. Hadoop b. Block
    c. Hive d. Batch

ANSWER: d
DIFFICULTY: Easy
REFERENCES: 14-2b MapReduce
LEARNING OBJECTIVES: 14.03 - Explain how the core components of the Hadoop framework operate

35. Two of the most popular applications to simplify the process of creating MapReduce jobs are Hive and _____.
    a. Flume b. Pig
    c. Sqoop d. Impala

ANSWER: b
DIFFICULTY: Easy
REFERENCES: 14-2c Hadoop Ecosystem
LEARNING OBJECTIVES: 14.04 - Identify the major components of the Hadoop ecosystem

36. _____ is a tool for converting data back and forth between a relational database and the HDFS.
    a. Flume b. Pig
    c. Sqoop d. Impala

ANSWER: c
DIFFICULTY: Easy
REFERENCES: 14-2c Hadoop Ecosystem
LEARNING OBJECTIVES: 14.04 - Identify the major components of the Hadoop ecosystem

37. _____ was the first SQL on Hadoop application.
    a. Flume b. Pig
    c. Sqoop d. Impala

ANSWER: d
DIFFICULTY: Easy
REFERENCES: 14-2c Hadoop Ecosystem
LEARNING OBJECTIVES: 14.04 - Identify the major components of the Hadoop ecosystem

38. Which of the following is NOT one of the standard NoSQL categories?
    a. Document databases b. Column-oriented databases

c. Graph databases d. Chart databases

ANSWER: d
DIFFICULTY: Easy
REFERENCES: 14-3 NoSQL
LEARNING OBJECTIVES: 14.05 - Summarize the four major approaches of the NoSQL data model and how they differ from the relational

39. To query the value component of the pair when using a key-value database, use get or _____.

a. store b. fetch
c. retrieve d. gather

ANSWER: b
DIFFICULTY: Easy
REFERENCES: 14-3a Key-Value Databases
LEARNING OBJECTIVES: 14.05 - Summarize the four major approaches of the NoSQL data model and how they differ from the relational

40. Document databases group documents into logical groups called _____.

a. buckets b. sets
c. collections d. blocks

ANSWER: c
DIFFICULTY: Easy
REFERENCES: 14-3b Document Databases
LEARNING OBJECTIVES: 14.05 - Summarize the four major approaches of the NoSQL data model and how they differ from the relational

41. _____ minimizes the number of disk reads necessary to retrieve a row of data.

a. Column-oriented database b. Row-centric storage
c. Column-family database d. Column-centric storage

ANSWER: b
DIFFICULTY: Easy
REFERENCES: 14-3c Column-Oriented Databases
LEARNING OBJECTIVES: 14.05 - Summarize the four major approaches of the NoSQL data model and how they differ from the relational

42. Modeling and storing data about relationships is the focus of _____ databases.

a. key-value b. column-oriented
c. document d d. graph

ANSWER: d
DIFFICULTY: Easy
REFERENCES: 14-3d Graph Databases
LEARNING OBJECTIVES: 14.05 - Summarize the four major approaches of the NoSQL data model and how they differ from the relational

43. Graph theory is a mathematical and computer science field that models relationships, or edges, between objects called _____.

a. maps b. scales
c. buckets d. nodes

ANSWER: d
DIFFICULTY: Easy
REFERENCES: 14-3d Graph Databases
LEARNING OBJECTIVES: 14.05 - Summarize the four major approaches of the NoSQL data model and how they differ from the relational

44. A query in a graph database is called a _____.
a. schema b. hierarchy
c. traversal d. script

ANSWER: c
DIFFICULTY: Easy
REFERENCES: 14-3d Graph Databases
LEARNING OBJECTIVES: 14.05 - Summarize the four major approaches of the NoSQL data model and how they differ from the relational

45. Data collected or aggregated around a central topic or entity is said to be _____ aware.
a. aggregate b. transversally
c. feedback d. visually

ANSWER: a
DIFFICULTY: Easy
REFERENCES: 14-3e Aggregate Awareness
LEARNING OBJECTIVES: 14.05 - Summarize the four major approaches of the NoSQL data model and how they differ from the relational

46. A _____ is a programmed function within an object used to manipulate the data in that same object.
a. batch b. method
c. block d. node

ANSWER: b
DIFFICULTY: Easy
REFERENCES: 14-5b Example of a MongoDB Query Using find()
LEARNING OBJECTIVES: 14.07 - Understand how to work with document databases using MongoDB

47. In MongoDB, _____ method retrieves objects from a collection that match the restrictions provided.
a. count* b. read*
c. review[] d. find()

ANSWER: d
DIFFICULTY: Moderate
REFERENCES: 14-5b Example of a MongoDB Query Using find()
LEARNING OBJECTIVES: 14.07 - Understand how to work with document databases using MongoDB

48. In MongoDB, the _____ method is used to improve the readability of retrieved documents through the use of line breaks and indention.

a. pretty() b. clean*
c. break[] d. filter+

ANSWER: a
DIFFICULTY: Moderate
REFERENCES: 14-5b Example of a MongoDB Query Using find()
LEARNING OBJECTIVES: 14.07 - Understand how to work with document databases using MongoDB

49. Neo4j is a _____ database.
a. graph b. column family
c. key-value d. row-centric

ANSWER: a
DIFFICULTY: Moderate
REFERENCES: 14-6 Working with Graph Databases Using Neo4j
LEARNING OBJECTIVES: 14.08 - Understand how to work with graph databases using Neo4j

50. A(n) _____ is a tag that is used to associate a collection of nodes as being of the same type or belonging to the same group.
a. edge b. key
c. label d. bucket

ANSWER: c
DIFFICULTY: Moderate
REFERENCES: 14-6a Creating Nodes in Neo4j
LEARNING OBJECTIVES: 14.08 - Understand how to work with graph databases using Neo4j

Completion

51. _____ is the Big Data 3 V that relates to the speed at which data is entering the system.
ANSWER: Velocity
DIFFICULTY: Easy
REFERENCES: 14-1 Big Data
LEARNING OBJECTIVES: 14.01 - Explain the role of Big Data in modern business

52. Scaling out is also referred to as _____.
ANSWER: clustering
DIFFICULTY: Moderate
REFERENCES: 14-1a Volume
LEARNING OBJECTIVES: 14.01 - Explain the role of Big Data in modern business

53. _____ refers to the analysis of the data to produce actionable results.
ANSWER: Feedback loop processing
DIFFICULTY: Easy
REFERENCES: 14-1b Velocity
LEARNING OBJECTIVES: 14.01 - Explain the role of Big Data in modern business

54. A method of text analysis that attempts to determine if a statement conveys a positive, negative, or neutral attitude is

referred to as _____ analysis.
ANSWER: sentimental
DIFFICULTY: Easy
REFERENCES: 14-1d Other Characteristics
LEARNING OBJECTIVES: 14.01 - Explain the role of Big Data in modern business

55. _____ is the coexistence of a variety of data storage and data management technologies within an organization's infrastructure.
ANSWER: Polyglot persistence
DIFFICULTY: Easy
REFERENCES: 14-1d Other Characteristics
LEARNING OBJECTIVES: 14.01 - Explain the role of Big Data in modern business

56. Within MapReduce, a(n) _____ runs maps and reduces tasks on nodes.
ANSWER: task tracker
DIFFICULTY: Easy
REFERENCES: 14-2b MapReduce
LEARNING OBJECTIVES: 14.03 - Explain how the core components of the Hadoop framework operate

57. Most organizations that use Hadoop also use a set of other related products that interact and complement each other to produce an entire _____ of applications and tools.
ANSWER: ecosystem
DIFFICULTY: Easy
REFERENCES: 14-2c Hadoop Ecosystem
LEARNING OBJECTIVES: 14.04 - Identify the major components of the Hadoop ecosystem

58. _____ languages allow the user to specify what they want, not how to get it which is very useful for query processing.
ANSWER: Declarative
DIFFICULTY: Easy
REFERENCES: 14-2c Hadoop Ecosystem
LEARNING OBJECTIVES: 14.04 - Identify the major components of the Hadoop ecosystem

59. Within Hadoop, _____ is used for producing data pipeline tasks that transform data in a series of steps.
ANSWER: Pig
DIFFICULTY: Easy
REFERENCES: 14-2c Hadoop Ecosystem
LEARNING OBJECTIVES: 14.04 - Identify the major components of the Hadoop ecosystem

60. Within Hadoop, _____ can transfer data in both directions - into and out of HDFS.
ANSWER: Sqoop
DIFFICULTY: Easy
REFERENCES: 14-2c Hadoop Ecosystem
LEARNING OBJECTIVES: 14.04 - Identify the major components of the Hadoop ecosystem

61. _____ databases simply store data with no attempt to understand the contents of the value component or its meaning.

ANSWER: Key-value
KV
DIFFICULTY: Easy
REFERENCES: 14-3a Key-Value Databases
LEARNING OBJECTIVES: 14.04 - Identify the major components of the Hadoop ecosystem

62. _____ is a human-readable text format for data interchange that defines attributes and values in a document.
ANSWER: JavaScript Object Notation
JSON
DIFFICULTY: Easy
REFERENCES: 14-3b Document Databases
LEARNING OBJECTIVES: 14.05 - Summarize the four major approaches of the NoSQL data model and how they differ from the relational

63. _____ do not store relationships as perceived in the relational model and generally have no support for join operations.
ANSWER: Document databases
DIFFICULTY: Easy
REFERENCES: 14-3b Document Databases
LEARNING OBJECTIVES: 14.05 - Summarize the four major approaches of the NoSQL data model and how they differ from the relational

64. _____ refers to traditional, relational database technologies that use column-centric, not row-centric storage.
ANSWER: Column-oriented database
Columnar database
DIFFICULTY: Easy
REFERENCES: 14-3c Column-Oriented Databases
LEARNING OBJECTIVES: 14.05 - Summarize the four major approaches of the NoSQL data model and how they differ from the relational

65. In a column family database, a column that is composed of a group of other related columns is called a(n) _____.
ANSWER: super column
DIFFICULTY: Easy
REFERENCES: 14-3c Column-Oriented Databases
LEARNING OBJECTIVES: 14.05 - Summarize the four major approaches of the NoSQL data model and how they differ from the relational

66. In a graph database, the representation of a relationship between nodes is called a(n) _____.
ANSWER: edge
DIFFICULTY: Easy
REFERENCES: 14-3d Graph Databases
LEARNING OBJECTIVES: 14.05 - Summarize the four major approaches of the NoSQL data model and how they differ from the relational

67. _____ are like attributes; they are the data that we need to store about the node.
ANSWER: Properties
DIFFICULTY: Easy

REFERENCES: 14-3d Graph Databases
LEARNING OBJECTIVES: 14.05 - Summarize the four major approaches of the NoSQL data model and how they differ from the relational

68. A database model that attempts to provide ACID-compliant transactions across a highly distributed infrastructure is _____.
ANSWER: NewSQL
DIFFICULTY: Easy
REFERENCES: 14-4 NewSQL Databases
LEARNING OBJECTIVES: 14.06 - Describe the characteristics of NewSQL databases

69. _____ is used to extract knowledge from sources of data—NoSQL databases, Hadoop data stores, and data warehouses—to provide decision support to all organizational users.
ANSWER: Data analytics
DIFFICULTY: Easy
REFERENCES: 14-6c Retrieving Relationship Data with MATCH
LEARNING OBJECTIVES: 14.08 - Understand how to work with graph databases using Neo4j

70. The interactive, declarative query language in Neo4j is called _____.
ANSWER: Cypher
DIFFICULTY: Easy
REFERENCES: 14-6a Creating Nodes in Neo4j
LEARNING OBJECTIVES: 14.08 - Understand how to work with graph databases using Neo4j

Essay

71. Discuss the 3 Vs of Big Data. How has the definition of Big Data regarding these items changed over time?
ANSWER: The three V's are Volume, Velocity and Variety:

Volume is the quantity of data to be stored and a key characteristic of Big Data. The storage capacities associated with Big Data are very large. As storage needs increase, they can be handled by scaling up or scaling out. Scaling up is keeping the same number of systems but migrating each to a larger system. Scaling out involves distributing data storage structures across a cluster of commodity servers.

Velocity is the speed at which data enters the system and is another key characteristic. In many ways, the issues of velocity mirror those of volume. The velocity of processing can be broken down into two categories: stream and feedback loop.

Variety refers to the vast array of formats and structures in which the data may be captured. Big Data requires that the data be captured in whatever format it naturally exists.

DIFFICULTY: Moderate
REFERENCES: 14-1 Big Data
LEARNING OBJECTIVES: 14.01 - Explain the role of Big Data in modern business

72. Define the four key assumptions of the Hadoop Distributed File System (HDFS).
ANSWER: *High volume*: The volume of data in Big Data applications is expected to be in terabytes, petabytes or larger. Hadoop assumes HDFS files will be extremely large

Write-once, ready-many: This model simplifies concurrent issues and improves overall data throughput. Using this model, a file is created, written to the file system and then closed. Once the file is closed, changes cannot be made to its contents which improves overall system performance and works well for the types of tasks performed by many Big Data applications.

Streaming access: Unlike transaction processing systems, Big Data applications typically process entire files. Hadoop is optimized for batch processing of entire files as continuous streams of data.

Fault tolerance: Hadoop is designed to be distributed across thousands of low-cost, commodity computers. The HDFS is designed to replicate data across many devices so that, when one fails, the data is still available from another device. By default, Hadoop uses a replication factor of three, meaning that each block of data is stored on three devices.

DIFFICULTY: Moderate

REFERENCES: 14-2a HDFS

LEARNING OBJECTIVES: 14.03 - Explain how the core components of the Hadoop framework operate

73. Discuss the need for a Hadoop ecosystem and identify the key components.

ANSWER: Because Hadoop is a very low-level tool requiring considerable effort to create, manage, and use, it presents quite a few obstacles. This has resulted in a host of related applications that attempt to make Hadoop easier to use and more accessible to users who are not skilled at complex Java programming. Most organizations that use Hadoop also use a set of other related products that interact and complement each other to produce an entire ecosystem of applications and tools.

MapReduce simplification applications have been developed to simplify the process of creating MapReduce jobs. Two of the most popular are Hive and Pig.

Data ingestion applications help to "ingest" or gather data into Hadoop from existing systems and include Flume. Sqoop is a tool for converting data back and forth between a relational database and HDFS.

Direct query applications attempt to provide faster query access than is possible through MapReduce and include HBase and Impala.

DIFFICULTY: Moderate

REFERENCES: 14-2c Hadoop Ecosystem

LEARNING OBJECTIVES: 14.04 - Identify the major components of the Hadoop ecosystem

74. What is NoSQL and what are the major NoSQL approaches (categories)?

ANSWER: NoSQL is the unfortunate name given to a broad array of nonrelational database technologies that have developed to address Big Data challenges. The name is unfortunate because it does not describe what the NoSQL technologies are, but rather what they are not. Even that explanation is poor. Literally hundreds of products can be considered as NoSQL. Most of them fit into one of four categories: key-value data stores, document databases, column-oriented databases and graph databases.

DIFFICULTY: Moderate

REFERENCES: 14-3 NoSQL

LEARNING OBJECTIVES: 14.05 - Summarize the four major approaches of the NoSQL data model and how they differ from the relational

75. Discuss NewSQL and what it attempts to do.

ANSWER: NewSQL is a database model that attempts to provide ACID-compliant transactions across a highly distributed infrastructure and are the latest technologies to appear to appear in the data management arena to address Big Data problems. As a new category of data management products, NewSQL databases have not yet developed a track record of success and have been adopted by relatively few organizations.

Because no technology can perfectly provide the advantages of both RDBMS and NoSQL, NewSQL has disadvantages, principally centered around its heavy use of in-memory storage.

DIFFICULTY: Moderate

REFERENCES: 14-4 NewSQL Databases

LEARNING OBJECTIVES: 14.06 - Describe the characteristics of NewSQL databases