Chapter 2: Database Development Process

TRUE/FALSE

1. Database designs that fail to recognize that the database is part of a larger information system are not likely to be successful.

   ANS: T PTS: 1

2. Systems analysis is used to determine the need for an information system and to establish its limits.

   ANS: T PTS: 1

3. The term “database development” is used to describe the process of database design and implementation.

   ANS: T PTS: 1

4. The primary objective in database design is to create complete, denormalized, redundant, and fully integrated conceptual, logical, and physical database models.

   ANS: F PTS: 1

5. The implementation phase of database design includes creating the database storage structure and loading the database, but does not provide for data management.

   ANS: F PTS: 1

6. The SDLC traces the history of an information system.

   ANS: T PTS: 1

7. The SDLC provides the big picture within which the database design and application development can be mapped out and evaluated.

   ANS: T PTS: 1

8. The SDLC's planning phase yields a general overview of the company and its objectives.

   ANS: T PTS: 1

9. Problems defined during the planning phase are examined in greater detail during the analysis phase.

   ANS: T PTS: 1

10. The existing hardware and software systems are studied during the planning phase.

    ANS: F PTS: 1

11. The result of analysis should be a better understanding of the system's functional areas, actual and potential problems, and opportunities.

    ANS: T PTS: 1

12. In the detailed systems design phase, the designer starts the design of the system's processes.

    ANS: F PTS: 1

13. In the detailed systems design phase, steps are laid out for conversion from the old system to the new system.

    ANS: T PTS: 1

14. Training principles and methodologies are planned during the implementation phase.

    ANS: F PTS: 1

15. The detailed systems design phase includes all the necessary technical specifications for the screens, menus, reports, and other devices used to make the system more efficient.

    ANS: T PTS: 1

16. During the implementation phase, the hardware, the DBMS software, and application programs are installed and the database design is implemented.

    ANS: T PTS: 1

17. During the testing phase, the system is subjected to exhaustive testing until it is ready for use.

    ANS: F PTS: 1

18. After testing is concluded, end-user training is not necessary.

    ANS: F PTS: 1

19. Because every request for structural changes requires retracing the SDLC steps, the system is always at some stage of the SDLC.

    ANS: T PTS: 1

20. A system maintenance activity generated in response to changes in the business environment is referred to as corrective maintenance.

    ANS: F PTS: 1

21. To analyze the company situation, the database designer must discover what the company's operational components are, how they function, and how they interact.

    ANS: T PTS: 1

22. After the initial declarations in a study, the database designer must carefully probe in order to generate additional information that will help define the problem within the larger framework of company operations.

    ANS: T PTS: 1

23. In most modern relational DBMSs, a new database implementation requires the creation of special storage-related constructs to house the end-user tables.

    ANS: T PTS: 1

24. Data integrity is enforced by the DBMS through the proper use of primary and foreign key rules.

    ANS: T PTS: 1

25. The testing and evaluation phase occurs after applications programming.

    ANS: F PTS: 1

26. Database performance is one of the least important factors in all database implementations.

    ANS: F PTS: 1

27. Performance evaluation is rendered more difficult by the fact that there are standard measurements for database performance.

    ANS: F PTS: 1

28. The database administrator must be prepared to perform routine maintenance activities within the database.

    ANS: T PTS: 1

29. Physical design becomes simpler when data is distributed at different locations.

    ANS: F PTS: 1

30. Decentralized design is typical of relatively simple and/or small databases and can be successfully done by a single person.

    ANS: F PTS: 1

MULTIPLE CHOICE

1. The process of creating an information system is known as ____ development.
   a. systems
   b. database
   c. network
   d. transformation

   ANS: A PTS: 1

2. The process of database design and implementation is ____ development.
   a. systems
   b. database
   c. network
   d. transformation

   ANS: B PTS: 1

3. The primary objective of database design is ____.
   a. to create the most efficient database possible
   b. to create complete, normalized, nonredundant, and fully integrated conceptual, logical, and physical database models
   c. to create the fastest queries
   d. to be able to add data quickly

   ANS: B PTS: 1

4. The traditional SDLC is divided into ____ phases.
   a. two
   b. three
   c. four
   d. five

   ANS: D PTS: 1

5. The initial assessment and the feasibility study are part of the SDLC's ____ phase.
   a. planning
   b. analysis
   c. detailed systems design
   d. implementation

   ANS: A PTS: 1

6. User requirements, existing system evaluation, and logical system design are part of the ____ phase of the SDLC.
   a. planning
   b. analysis
   c. detailed systems design
   d. implementation

   ANS: B PTS: 1

7. A detailed system specification is part of the ____ phase of the SDLC.
   a. planning
   b. analysis
   c. detailed systems design
   d. implementation

   ANS: C PTS: 1

8. Coding, testing, and debugging are part of the ____ phase of the SDLC.
   a. planning
   b. analysis
   c. detailed systems design
   d. implementation

   ANS: D PTS: 1

9. Installation and fine tuning are part of the ____ phase of the SDLC.
   a. planning
   b. analysis
   c. detailed systems design
   d. implementation

   ANS: D PTS: 1

10. Evaluation, maintenance, and enhancement are part of the ____ phase of the SDLC.
    a. planning
    b. maintenance
    c. detailed systems design
    d. implementation

    ANS: B PTS: 1

11. The SDLC is most important to the ____.
    a. programmer
    b. manager
    c. system designer
    d. database administrator

    ANS: C PTS: 1

12. "Should the existing system be replaced?" is a question that is asked during the ____ stage of the SDLC.
    a. planning
    b. analysis
    c. implementation
    d. maintenance

    ANS: A PTS: 1

13. "What are the requirements of the current system's end users?"is a question asked during the ____ phase of the SDLC.
    a. planning
    b. analysis
    c. implementation
    d. maintenance

    ANS: B PTS: 1

14. The logical systems design is created during the ____ phase of the SDLC.
    a. planning
    b. analysis
    c. implementation
    d. maintenance

    ANS: B PTS: 1

15. The design of the system's processes is completed during the ____ phase of the SDLC.
    a. planning
    b. analysis
    c. detailed systems design
    d. implementation

    ANS: C PTS: 1

16. The database is loaded during the ____ phase of the SDLC.
    a. analysis
    b. detailed systems design
    c. implementation
    d. maintenance

    ANS: C PTS: 1

17. There are ____ stages in the DBLC.
    a. four
    b. five
    c. six
    d. seven

    ANS: C PTS: 1

18. The implementation of ____-produced applications tends to prolong the operational life of systems by making them easier to update and maintain.
    a. database
    b. network
    c. CASE
    d. design

    ANS: C PTS: 1

19. Analyzing the company situation is part of the ____ phase of the DBLC.
    a. database initial study
    b. database design
    c. implementation and loading, testing, and evaluation
    d. operation

    ANS: A PTS: 1

20. Creating the conceptual design and selecting DBMS software are part of the ____ phase of the DBLC.
    a. database initial study
    b. database design
    c. implementation and loading
    d. testing and evaluation

    ANS: B PTS: 1

21. Installing the DBMS, creating the database, and loading or converting the data are part of the ____ phase of the DBLC.
    a. database initial study
    b. database design
    c. implementation and loading
    d. testing and evaluation

    ANS: C PTS: 1

22. Testing, fine-tuning, and evaluating the database and its applications are part of the ____ phase of the DBLC.
    a. database initial study
    b. database design
    c. implementation and loading
    d. testing and evaluation

    ANS: D PTS: 1

23. Producing the required information flow is part of the ____ phase of the DBLC.
    a. database initial study
    b. database design
    c. operation
    d. testing and evaluation

    ANS: C PTS: 1

24. The last step in the DBLC is ____.
    a. maintenance and evolution
    b. operation
    c. testing and evaluation
    d. implementation and loading

    ANS: A PTS: 1

25. The first step in the DBLC is ____.
    a. operation
    b. database initial study
    c. database design
    d. implementation and loading

    ANS: B PTS: 1

26. The database initial study phase of the DBLC involves ____.
    a. defining objectives
    b. introducing changes
    c. testing the database
    d. installing the DBMS

    ANS: A PTS: 1

27. The implementation and loading phase of the DBLC involves ____.
    a. defining objectives
    b. introducing changes
    c. testing the database
    d. installing the DBMS

    ANS: D PTS: 1

28. The conceptual design step that determines end-user views, outputs, and transaction-processing requirements is ____.
    a. data analysis and requirements
    b. entity relationship modeling and normalization
    c. data model verification
    d. distributed database design

    ANS: A PTS: 1

29. The conceptual design step that defines entities, attributes, and relationships is ____.
    a. database analysis and requirements
    b. entity relationship modeling and normalization
    c. data model verification
    d. distributed database design

    ANS: B PTS: 1

30. The conceptual design step that identifies ER modules and validates insert, update, and delete rules is ____.
    a. database analysis and requirements
    b. ER modeling and normalization
    c. data-model verification
    d. distributed database design

    ANS: C PTS: 1

31. The conceptual design step that defines the DBMS and data model to use is ____.
    a. database analysis and requirements
    b. ER modeling and normalization
    c. data-model verification
    d. distributed database design

    ANS: D PTS: 1

32. ____ allow(s) physical access to areas by authorized personnel only.
    a. Physical security
    b. Password security
    c. Access rights
    d. Data encryption

    ANS: A PTS: 1

33. Once the data has been loaded into the database, the ____ tests and fine-tunes the database for performance, integrity, concurrent access, and security constraints.
    a. programmer
    b. manager
    c. database administrator
    d. systems administrator

    ANS: C PTS: 1

34. The maintenance and evolution phase of the DBLC involves ____.
    a. defining objectives
    b. introducing changes
    c. testing the database
    d. installing the DBMS

    ANS: B PTS: 1

35. The first step in developing the conceptual model using ER diagrams is to ____.
    a. normalize the entities
    b. complete the initial ER diagram
    c. identify, analyze, and refine the business rules
    d. define the attributes, primary keys, and foreign keys for each of the entities

    ANS: C PTS: 1

36. The first step in the ER model verification process is to ____.
    a. identify each module and its components
    b. identify the ER model's central entity
    c. verify all processes against the ER model
    d. identify each module's internal transaction requirements

    ANS: B PTS: 1

37. ____ coupling describes the extent to which modules are independent of one another.
    a. Verification
    b. Process
    c. Module
    d. Cohesive

    ANS: C PTS: 1

38. The ____ design is the process of selecting the data storage and data access characteristics of the database.
    a. time
    b. network
    c. logical
    d. physical

    ANS: D PTS: 1

39. There are ____ classical approaches to database design.
    a. two
    b. three
    c. four
    d. five

    ANS: A PTS: 1

40. During decentralized design, after the ____ process has been completed, all modules are integrated into one conceptual model.
    a. initial
    b. verification
    c. conceptual
    d. logical

ANS: B PTS: 1

COMPLETION

1. A(n) _____ is a carefully designed and constructed repository of facts that is a part of a larger whole known as an information system.

   ANS: database

   PTS: 1

2. _____ is the process that establishes the need for, and the extent of, an information system.

   ANS:
   System analysis
   Systems analysis

   PTS: 1

3. The traditional SDLC phases are _____, analysis, detailed systems design, implementation, and maintenance.

   ANS: planning

   PTS: 1

4. An initial assessment of the information flow-and-extent requirements must be made during the _____ portion of the SDLC.

   ANS:
   discovery
   planning

   PTS: 1

5. The database contents may be loaded interactively or in _____ mode.

   ANS: batch

   PTS: 1

6. After testing is concluded, the final _____ is reviewed and printed and end users are trained.

   ANS: documentation

   PTS: 1

7. The advent of very sophisticated application generators and _____ tools has substantially decreased coding and testing time.

   ANS: debugging

   PTS: 1

8. The company _____ describes the general conditions in which a company operates, its organizational structure, and its mission.

   ANS: situation

   PTS: 1

9. The system's _____ defines the extent of the design according to operational requirements.

   ANS: scope

   PTS: 1

10. The proposed system is subject to limits known as _____, which are external to the system.

    ANS: boundaries

    PTS: 1

11. Making sure that the final product meets user and system requirements is the most critical _____ phase.

    ANS:
    DBLC
    Database Life Cycle
    Database Life Cycle (DBLC)

    PTS: 1

12. The implementation of the logical design in IBM's DB2 would require that you assign the rights to use the database to a(n) _____.

    ANS: database administrator

    PTS: 1

13. _____ security allows the assignment of access rights to specific authorized users.

    ANS: Password

    PTS: 1

14. A(n) _____ log backup backs up only the transaction log operations that are not reflected in a previous backup copy of the database.

    ANS: transaction

    PTS: 1

15. The _____ design stage uses data modeling to create an abstract database structure that represents real-world objects in the most realistic way possible.

    ANS: conceptual

    PTS: 1

16. The first step in _____ design is to discover the data element characteristics.

    ANS: conceptual

    PTS: 1

17. In order to develop an accurate data _____, the designer must have a thorough understanding of the company's data types, extent, and uses.

    ANS: model

    PTS: 1

18. From a database point of view, the collection of data becomes meaningful only when the business _____ are defined.

    ANS: rules

    PTS: 1

19. A(n) _____ rule is a brief and precise narrative of a policy, procedure, or principle within a specific organization's environment.

    ANS: business

    PTS: 1

20. Because real-world database design is generally done by teams, you should strive to organize the design's major components into _____.

    ANS: modules

    PTS: 1

21. A(n) _____ is an information system component that handles a specific business function, such as inventory, orders, payroll, and so on.

    ANS: module

    PTS: 1

22. The term "module _____" describes the extent to which modules are independent of one another.

    ANS: coupling

    PTS: 1

23. When selecting DBMS _____, consider processor(s), RAM, disk space, and so on.

    ANS: hardware

    PTS: 1

24. The _____ design goal is to design an enterprise-wide database based on a specific data model but independent of physical-level details.

    ANS: logical

    PTS: 1

25. _____ design could become a very technical job that affects not only the accessibility of the data in the storage device(s) but also the performance of the system.

    ANS: Physical

    PTS: 1

ESSAY

1. List and briefly describe the three types of system maintenance activities.

   ANS:
   The three types of maintenance activities are:
   Corrective maintenance in response to systems errors
   Adaptive maintenance due to changes in the business environment
   Perfective maintenance to enhance the system

   PTS: 1

2. Database backups can be performed at different levels. List and describe these.

   ANS:
   A full backup, or dump, of the entire database. In this case, all database objects are backed up in their entirety.
   A differential backup of the database, in which only the objects that have been updated or modified since the last full backup are backed up.
   A transaction log backup, which backs up only the transaction log operations that are not reflected in a previous backup copy of the database. In this case, no other database objects are backed up.

   PTS: 1

3. What are the factors affecting the purchasing decision for DBMS software?

   ANS:
   Cost. This includes the original purchase price, along with maintenance, operational, license, installation, training, and conversion costs.
   DBMS features and tools. Some database software includes a variety of tools that facilitate application development. For example, the availability of query by example (QBE), screen painters, report generators, application generators, and data dictionaries helps to create a more pleasant work environment for both the end user and the application programmer. Database administrator facilities, query facilities, ease of use, performance, security, concurrency control, transaction processing, and third-party support also influence DBMS software selection.
   Underlying model. This can be hierarchical, network, relational, object/relational, or object-oriented.
   Portability. A DBMS can be portable across platforms, systems, and languages.
   DBMS hardware requirements. Items to consider include processor(s), RAM, disk space, and so on.

   PTS: 1

4. What are the classical approaches to database design?

   ANS:
   There are two classical approaches to database design:
   Top-down design starts by identifying the data sets and then defines the data elements for each of those sets. This process involves the identification of different entity types and the definition of each entity's attributes.
   Bottom-up design first identifies the data elements (items) and then groups them together in data sets. In other words, it first defines attributes, and then groups them to form entities.

   PTS: 1

5. Explain the differences between a centralized and decentralized approach to database design.

   ANS:
   Centralized design is productive when the data component has a relatively small number of objects and procedures. The design can be carried out and represented in a fairly simple database. Centralized design is typical of relatively simple, small databases and can be successfully done by a single database administrator or by a small, informal design team. The company operations and the scope of the problem are sufficiently limited to allow even a single designer to define the problem(s), create the conceptual design, verify the conceptual design with the user views, define system processes and data constraints to ensure the efficacy of the design, and ensure that the design will comply with all the requirements. (Although centralized design is typical for small companies, do not make the mistake of assuming that it is limited to small companies. Even large companies can operate within a relatively simple database environment.)

   Decentralized design might be used when the system's data component has a considerable number of entities and complex relations on which very complex operations are performed. Decentralized design is also often used when the problem itself is spread across several operational sites and each element is a subset of the entire data set. In large and complex projects, the database typically cannot be designed by only one person. Instead, a carefully selected team of database designers tackles a complex database project. Within the decentralized design framework, the database design task is divided into several modules. Once the design criteria have been established, the lead designer assigns design subsets or modules to design groups within the team.

   PTS: 1