CHAPTER 10: TRANSACTION MANAGEMENT AND CONCURRENCY CONTROL

1. Most real-world database transactions are formed by only one database request.
   a. True
   b. False

   ANSWER: False
   PTS: 1   DIF: Difficulty: Easy   REF: p.484
   NAT: BUSPROG: Technology   STATE: DIS: Information Technology
   KEY: Bloom's: Knowledge   TOP: What is a Transaction?

2. Although the DBMS is designed to recover a database to a previous consistent state when an interruption prevents the completion of a required set of transactions, the transactions themselves are defined by the end user or programmer and must be semantically correct.
   a. True
   b. False

   ANSWER: True
   PTS: 1   DIF: Difficulty: Moderate   REF: p.486
   NAT: BUSPROG: Analytic   STATE: DIS: Information Technology
   KEY: Bloom's: Comprehension   TOP: What is a Transaction?

3. The DBMS guarantees that the semantic meaning of a transaction truly represents the real-world event.
   a. True
   b. False

   ANSWER: False
   PTS: 1   DIF: Difficulty: Easy   REF: p.486
   NAT: BUSPROG: Technology   STATE: DIS: Information Technology
   KEY: Bloom's: Knowledge   TOP: What is a Transaction?

4. Atomicity indicates the permanence of the database's consistent state.
   a. True
   b. False

   ANSWER: False
   PTS: 1   DIF: Difficulty: Easy   REF: p.487
   NAT: BUSPROG: Technology   STATE: DIS: Information Technology
   KEY: Bloom's: Knowledge   TOP: What is a Transaction?

5. Serializability means that data used during the execution of a transaction cannot be used by a second transaction until the first one is completed.
   a. True
   b. False

   ANSWER: False
   PTS: 1   DIF: Difficulty: Easy   REF: p.487
   NAT: BUSPROG: Technology   STATE: DIS: Information Technology
   KEY: Bloom's: Knowledge   TOP: What is a Transaction?

6. Incomplete or improper transactions can have a devastating effect on database integrity.
   a. True
   b. False

   ANSWER: True
   PTS: 1   DIF: Difficulty: Easy   REF: p.487
   NAT: BUSPROG: Technology   STATE: DIS: Information Technology
   KEY: Bloom's: Knowledge   TOP: What is a Transaction?

7. Durability requires that all portions of the transaction must be treated as a single, logical unit of work in which
   all operations are applied and completed to produce a consistent database.
   a. True
   b. False

   ANSWER: False
   PTS: 1   DIF: Difficulty: Easy   REF: p.487
   NAT: BUSPROG: Technology   STATE: DIS: Information Technology
   KEY: Bloom's: Knowledge   TOP: What is a Transaction?

8. The multiuser DBMS must implement controls to ensure serializability and isolation of transactions, in
   addition to atomicity and durability, in order to guard the database's consistency and integrity.
   a. True
   b. False

   ANSWER: True
   PTS: 1   DIF: Difficulty: Easy   REF: p.488
   NAT: BUSPROG: Technology   STATE: DIS: Information Technology
   KEY: Bloom's: Knowledge   TOP: What is a Transaction?

9. The phenomenon of uncommitted data occurs when two transactions are executed concurrently and the first
   transaction is rolled back after the second transaction has already accessed the uncommitted data—thus
   violating the isolation property of transactions.
   a. True
   b. False

   ANSWER: True
   PTS: 1   DIF: Difficulty: Moderate   REF: p.491
   NAT: BUSPROG: Analytic   STATE: DIS: Information Technology
   KEY: Bloom's: Comprehension   TOP: Concurrency Control

10. The scheduler establishes the order in which the operations within concurrent transactions are executed.
    a. True
    b. False

    ANSWER: True
    PTS: 1   DIF: Difficulty: Easy   REF: p.494
    NAT: BUSPROG: Technology   STATE: DIS: Information Technology
    KEY: Bloom's: Knowledge   TOP: Concurrency Control

11. A scheduler facilitates data isolation to ensure that two transactions do not update the same data element at the same time.
    a. True
    b. False

    ANSWER: True
    PTS: 1   DIF: Difficulty: Easy   REF: p.495
    NAT: BUSPROG: Technology   STATE: DIS: Information Technology
    KEY: Bloom's: Knowledge   TOP: Concurrency Control

12. A lock guarantees the open use of a data item to multiple transactions.
    a. True
    b. False

    ANSWER: False
    PTS: 1   DIF: Difficulty: Easy   REF: p.495
    NAT: BUSPROG: Technology   STATE: DIS: Information Technology
    KEY: Bloom's: Knowledge   TOP: Concurrency Control with Locking Methods

13. In a page-level lock, the DBMS will lock an entire diskpage.
    a. True
    b. False

    ANSWER: True
    PTS: 1   DIF: Difficulty: Easy   REF: p.497
    NAT: BUSPROG: Technology   STATE: DIS: Information Technology
    KEY: Bloom's: Knowledge   TOP: What is a Transaction?

14. A field-level lock allows concurrent transactions to access the same row, as long as they require the use of different fields within that row.
    a. True
    b. False

    ANSWER: True
    PTS: 1   DIF: Difficulty: Easy   REF: p.498
    NAT: BUSPROG: Technology   STATE: DIS: Information Technology
    KEY: Bloom's: Knowledge   TOP: Concurrency Control with Locking Methods

15. A shared lock produces no conflict as long as all the concurrent transactions are read-write only.
    a. True
    b. False

    ANSWER: False
    PTS: 1   DIF: Difficulty: Easy   REF: p.499
    NAT: BUSPROG: Technology   STATE: DIS: Information Technology
    KEY: Bloom's: Knowledge   TOP: Concurrency Control with Locking Methods

16. A growing phase in a two-phase lock is when a transaction acquires all the required locks without locking any data.
    a. True
    b. False

    ANSWER: False
    PTS: 1   DIF: Difficulty: Easy   REF: p.500
    NAT: BUSPROG: Technology   STATE: DIS: Information Technology
    KEY: Bloom's: Knowledge   TOP: Concurrency Control with Locking Methods

17. Timestamps must only have the single property of uniqueness.
    a. True
    b. False

    ANSWER: False
    PTS: 1   DIF: Difficulty: Easy   REF: p.502
    NAT: BUSPROG: Technology   STATE: DIS: Information Technology
    KEY: Bloom's: Knowledge   TOP: Concurrency Control with Time Stamping
                                                            Methods

18. Time stamping demands a lot of system resources because many transactions might have to be stopped, rescheduled, and stamped.
    a. True
    b. False

    ANSWER: True
    PTS: 1   DIF: Difficulty: Easy   REF: p.502
    NAT: BUSPROG: Technology   STATE: DIS: Information Technology
    KEY: Bloom's: Knowledge   TOP: Concurrency Control with Time Stamping
                                                            Methods

19. An optimistic approach is based on the assumption that the majority of the database operations do not conflict.
    a. True
    b. False

    ANSWER: True
    PTS: 1   DIF: Difficulty: Easy   REF: p.503
    NAT: BUSPROG: Technology   STATE: DIS: Information Technology
    KEY: Bloom's: Knowledge   TOP: Concurrency Control with Optimistic
                                                            Methods

20. When using an optimistic approach, during the read phase, a transaction reads the database, executes the needed computations, and makes the updates to a private copy of the database values.
    a. True
    b. False

ANSWER: True
PTS: 1   DIF: Difficulty: Moderate   REF: p.504
NAT: BUSPROG: Analytic   STATE: DIS: Information Technology
KEY: Bloom's: Comprehension   TOP: Concurrency Control with Optimistic
                                                             Methods

21. The serializable isolation level is the least restrictive level defined by the ANSI SQL standard.
   a. True
   b. False

   ANSWER: False
   PTS: 1   DIF: Difficulty: Easy   REF: p.505
   NAT: BUSPROG: Technology   STATE: DIS: Information Technology
   KEY: Bloom's: Knowledge   TOP: Ansi Levels of Transaction Isolation

22. The reason for the different levels of isolation is to increase transaction concurrency.
   a. True
   b. False

   ANSWER: True
   PTS: 1   DIF: Difficulty: Easy   REF: p.505
   NAT: BUSPROG: Technology   STATE: DIS: Information Technology
   KEY: Bloom's: Knowledge   TOP: Ansi Levels of Transaction Isolation

23. The transaction recovery write-ahead-log protocol ensures that transaction logs are always written before any
   database data are actually updated.
   a. True
   b. False

   ANSWER: True
   PTS: 1   DIF: Difficulty: Easy   REF: p.506
   NAT: BUSPROG: Technology   STATE: DIS: Information Technology
   KEY: Bloom's: Knowledge   TOP: Database Recovery Management

24. The last step in the write-through technique recovery procedure is to identify the last checkpoint in the
   transaction log.
   a. True
   b. False

   ANSWER: False
   PTS: 1   DIF: Difficulty: Easy   REF: p.507
   NAT: BUSPROG: Technology   STATE: DIS: Information Technology
   KEY: Bloom's: Knowledge   TOP: Database Recovery Management

25. A transaction is a_____unit of work that must be either entirely completed or aborted.
   a. timed   b. practical
   c. logical   d. physical

ANSWER: c
PTS: 1   DIF: Difficulty: Easy   REF: p.484
NAT: BUSPROG: Technology   STATE: DIS: Information Technology
KEY: Bloom's: Knowledge   TOP: What is a Transaction?

26. A consistent database state is_____.
   a. one in which all tables have foreign keys   b. one in which all data integrity constraints are satisfied

   c. one in which all tables are normalized   d. one in which all SQL statements only update one table at
                                                           a time

ANSWER: b
PTS: 1   DIF: Difficulty: Easy   REF: p.484
NAT: BUSPROG: Technology   STATE: DIS: Information Technology
KEY: Bloom's: Knowledge   TOP: What is a Transaction?

27. _____requires that all operations of a transaction be completed.
   a. Specificity   b. Atomicity

   c. Durability   d. Time stamping

ANSWER: b
PTS: 1   DIF: Difficulty: Easy   REF: p.487
NAT: BUSPROG: Technology   STATE: DIS: Information Technology
KEY: Bloom's: Knowledge   TOP: What is a Transaction?

28. _____means that data used during the execution of a transaction cannot be used by a second transaction until
   the first one is completed.
   a. Serializability   b. Atomicity

   c. Isolation   d. Time stamping

ANSWER: c
PTS: 1   DIF: Difficulty: Easy   REF: p.487
NAT: BUSPROG: Technology   STATE: DIS: Information Technology
KEY: Bloom's: Knowledge   TOP: What is a Transaction?

29. A single-user database system automatically ensures_____of the database, because only one transaction is
   executed at a time.
   a. serializability and durability   b. atomicity and isolation

   c. serializability and isolation   d. atomicity and serializability

ANSWER: c
PTS: 1   DIF: Difficulty: Moderate   REF: p.488
NAT: BUSPROG: Analytic   STATE: DIS: Information Technology
KEY: Bloom's: Comprehension   TOP: What is a Transaction?

30. The ANSI has defined standards that govern SQL database transactions. Transaction support is provided by
   two SQL statements:___and ROLLBACK.
   a. RETRIEVE   b. ASSIGN

   c. UPDATE   d. COMMIT

ANSWER: d
PTS: 1   DIF: Difficulty: Easy   REF: p.488
NAT: BUSPROG: Technology   STATE: DIS: Information Technology
KEY: Bloom's: Knowledge   TOP: What is a Transaction?

31. ANSI defines four events that signal the end of a transaction. Of the following events, which is defined by ANSI as being equivalent to a COMMIT?
    a. Five SQL statements are executed.   b. The end of a program is successfully reached.
    c. The program is abnormally terminated.   d. The database is shut down for maintenance.

    ANSWER: b
    PTS: 1   DIF: Difficulty: Easy   REF: p.488
    NAT: BUSPROG: Technology   STATE: DIS: Information Technology
    KEY: Bloom's: Knowledge   TOP: What is a Transaction?

32. ANSI defines four events that signal the end of a transaction. Of the following events, which is defined by ANSI as being equivalent to a ROLLBACK?
    a. Five SQL statements are executed.   b. The end of a program is successfully reached.
    c. The program is abnormally terminated.   d. The database is shut down for maintenance.

    ANSWER: c
    PTS: 1   DIF: Difficulty: Easy   REF: p.488
    NAT: BUSPROG: Technology   STATE: DIS: Information Technology
    KEY: Bloom's: Knowledge   TOP: What is a Transaction?

33. The implicit beginning of a transaction is_____.
    a. when the database is started   b. when a table is accessed for the first time
    c. when the first SQL statement is encountered   d. when the COMMIT command is issued

    ANSWER: c
    PTS: 1   DIF: Difficulty: Easy   REF: p.489
    NAT: BUSPROG: Technology   STATE: DIS: Information Technology
    KEY: Bloom's: Knowledge   TOP: What is a Transaction?

34. The information stored in the_____is used by the DBMS for a recovery requirement triggered by a ROLLBACK statement, a program's abnormal termination, or a system failure such as a network discrepancy or a disk crash.
    a. data dictionary   b. metadata
    c. rollback manager   d. transaction log

    ANSWER: d
    PTS: 1   DIF: Difficulty: Easy   REF: p.489
    NAT: BUSPROG: Technology   STATE: DIS: Information Technology
    KEY: Bloom's: Knowledge   TOP: What is a Transaction?

35. One of the three most common data integrity and consistency problems is_____.
    a. lost updates   b. disk failures
    c. user errors   d. deadlocks

ANSWER: a
PTS: 1   DIF: Difficulty: Easy   REF: p.490
NAT: BUSPROG: Technology   STATE: DIS: Information Technology
KEY: Bloom's: Knowledge   TOP: Concurrency Control

36. _____occurs when a transaction accesses data before and after one or more other transactions finish working with such data.
   a. Inconsistent retrievals   b. The phenomena of uncommitted data

   c. Lost update problems   d. Dirty read problems

ANSWER: a
PTS: 1   DIF: Difficulty: Easy   REF: p.492
NAT: BUSPROG: Technology   STATE: DIS: Information Technology
KEY: Bloom's: Knowledge   TOP: Concurrency Control

37. As long as two transactions, T1 and T2, access_____data, there is no conflict, and the order of execution is irrelevant to the final outcome.
   a. shared   b. common

   c. unrelated   d. locked

ANSWER: c
PTS: 1   DIF: Difficulty: Easy   REF: p.494
NAT: BUSPROG: Technology   STATE: DIS: Information Technology
KEY: Bloom's: Knowledge   TOP: Concurrency Control

38. _____are required to prevent another transaction from reading inconsistent data.
   a. Locks   b. Schedules

   c. Stamps   d. Logs

ANSWER: a
PTS: 1   DIF: Difficulty: Easy   REF: p.495
NAT: BUSPROG: Technology   STATE: DIS: Information Technology
KEY: Bloom's: Knowledge   TOP: Concurrency Control with Locking
                                                        Methods

39. The_____manager is responsible for assigning and policing the locks used by the transactions.
   a. transaction   b. database

   c. lock   d. schedule

ANSWER: c
PTS: 1   DIF: Difficulty: Easy   REF: p.495
NAT: BUSPROG: Technology   STATE: DIS: Information Technology
KEY: Bloom's: Knowledge   TOP: Concurrency Control with Locking
                                                        Methods

40. Lock_____indicates the level of lock use.
   a. granularity   b. shrinking

   c. growing   d. serializability

ANSWER: a

PTS: 1   DIF: Difficulty: Easy   REF: p.496
NAT: BUSPROG: Technology   STATE: DIS: Information Technology
KEY: Bloom's: Knowledge   TOP: Concurrency Control with Locking
                                              Methods

41. A _____ lock locks the entire table preventing access to any row by a transaction while another transaction is using the table.
   a. database-level   b. table-level

   c. page-level   d. row-level

   ANSWER: b
   PTS: 1   DIF: Difficulty: Easy   REF: p.496
   NAT: BUSPROG: Technology   STATE: DIS: Information Technology
   KEY: Bloom's: Knowledge   TOP: Concurrency Control with Locking

                                              Methods

42. A _____ lock locks the entire diskpage.
   a. transaction-level   b. table-level

   c. page-level   d. row-level

   ANSWER: c
   PTS: 1   DIF: Difficulty: Easy   REF: p.497
   NAT: BUSPROG: Technology   STATE: DIS: Information Technology
   KEY: Bloom's: Knowledge   TOP: Concurrency Control with Locking
                                              Methods

43. A diskpage, or page, is the equivalent of a_____ .
   a. database table   b. disk sector

   c. database schema   d. diskblock

   ANSWER: d
   PTS: 1   DIF: Difficulty: Easy   REF: p.497
   NAT: BUSPROG: Technology   STATE: DIS: Information Technology
   KEY: Bloom's: Knowledge   TOP: Concurrency Control with Locking
                                              Methods

44. A_____ lock allows concurrent transactions to access different rows of the same table.
   a. database-level   b. table-level

   c. page-level   d. row-level

   ANSWER: d
   PTS: 1   DIF: Difficulty: Easy   REF: p.498
   NAT: BUSPROG: Technology   STATE: DIS: Information Technology
   KEY: Bloom's: Knowledge   TOP: Concurrency Control with Locking
                                              Methods

45. A(n)_____ specifically reserves access to the transaction that locked the object.
   a. shared lock   b. exclusive lock

   c. binary lock   d. deadlock

ANSWER: b
PTS: 1   DIF: Difficulty: Easy   REF: p.499
NAT: BUSPROG: Technology   STATE: DIS: Information Technology
KEY: Bloom's: Knowledge   TOP: Concurrency Control with Locking
                                                                        Methods

46. A(n)_____lock exists when concurrent transactions are granted read access on the basis of a common lock.
   a. shared   b. exclusive

   c. binary   d. two-phase

ANSWER: a
PTS: 1   DIF: Difficulty: Easy   REF: p.499
NAT: BUSPROG: Technology   STATE: DIS: Information Technology
KEY: Bloom's: Knowledge   TOP: Concurrency Control with Locking
                                                                        Methods

47. What is a rule that applies to the two-phase locking protocol?
   a. Two transactions cannot have conflicting locks.

   b. No unlock operation can precede a lock operation in a different transaction.

   c. No data is affected until all locks are released.

   d. No data is affected until the transaction is in its locked position.

ANSWER: a
PTS: 1   DIF: Difficulty: Moderate   REF: p.500
NAT: BUSPROG: Analytic   STATE: DIS: Information Technology
KEY: Bloom's: Comprehension   TOP: Concurrency Control with Locking
                                                                        Methods

48. A(n)_____phase in a two-phase lock is when a transaction releases all locks and cannot obtain any new lock.
   a. growing   b. shrinking

   c. locking   d. unlocking

ANSWER: b
PTS: 1   DIF: Difficulty: Easy   REF: p.500
NAT: BUSPROG: Technology   STATE: DIS: Information Technology
KEY: Bloom's: Knowledge   TOP: Concurrency Control with Locking
                                                                        Methods

49. A(n)_____condition occurs when two or more transactions wait for each other to unlock data.
   a. deadlock   b. exclusive lock

   c. binary lock   d. two-phase lock

ANSWER: a
PTS: 1   DIF: Difficulty: Easy   REF: p.500
NAT: BUSPROG: Technology   STATE: DIS: Information Technology
KEY: Bloom's: Knowledge   TOP: Concurrency Control with Locking
                                                                        Methods

50. The_____approach to scheduling concurrent transactions assigns a global unique stamp to each transaction.
    a. scheduled   b. table-locking

    c. unique   d. timestamping

    ANSWER: d
    PTS: 1   DIF: Difficulty: Easy   REF: p.502
    NAT: BUSPROG: Technology   STATE: DIS: Information Technology
    KEY: Bloom's: Knowledge   TOP: Concurrency Control with Time Stamping
                                                            Methods

51. In the wait/die scheme,:
    a. the older transaction rolls back the younger transaction and reschedules it.

    b. the younger, preempted transaction is rescheduled using the same time stamp.

    c. the older transaction waits for the younger one to complete and release its locks.

    d. both the younger and older transactions wait indefinitely to be released.

    ANSWER: c
    PTS: 1   DIF: Difficulty: Easy   REF: p.503
    NAT: BUSPROG: Technology   STATE: DIS: Information Technology
    KEY: Bloom's: Knowledge   TOP: Concurrency Control with Time Stamping
                                                            Methods

52. In the optimistic approach, during the_____phase, a transaction scans the database, executes the needed computations, and makes the updates to a private copy of the database values.
    a. read   b. validation

    c. write   d. shared

    ANSWER: a
    PTS: 1   DIF: Difficulty: Easy   REF: p.504
    NAT: BUSPROG: Technology   STATE: DIS: Information Technology
    KEY: Bloom's: Knowledge   TOP: Concurrency Control with Optimistic
                                                            Methods

53. In the optimistic approach, during the_____phase, changes are permanently applied to the database.
    a. read   b. validation

    c. write   d. shared

    ANSWER: c
    ANSWER: True
    PTS: 1   DIF: Difficulty: Easy   REF: p.504
    NAT: BUSPROG: Technology   STATE: DIS: Information Technology
    KEY: Bloom's: Knowledge   TOP: Concurrency Control with Optimistic
                                                            Methods

54. The_____isolation level ensures that queries return consistent results.
    a. Read Uncommitted   b. Read Committed

    c. Serializable   d. Repeatable Read

ANSWER: d
ANSWER: True
PTS: 1   DIF: Difficulty: Easy   REF: p.504
NAT: BUSPROG: Technology   STATE: DIS: Information Technology
KEY: Bloom's: Knowledge   TOP: Concurrency Control with Optimistic
                                                                                Methods

55. A(n)_____occurs when a transaction executes a query at time t1, and then it runs the same query at time t2, yielding additional rows that satisfy the query.

a. phantom read   b. dirty read

c. uncommitted dependency   d. nonrepeatable read

ANSWER: a
PTS: 1   DIF: Difficulty: Easy   REF: p.504
NAT: BUSPROG: Technology   STATE: DIS: Information Technology
KEY: Bloom's: Knowledge   TOP: Concurrency Control with Optimistic
                                                                                Methods

56. Although the DBMS is designed to recover a database to a previous consistent state when an interruption prevents the completion of a required set of transactions, the transactions themselves are defined by the end user or programmer and must be._____correct.

ANSWER: semantically
PTS: 1   DIF: Difficulty: Moderate   REF: p.486
NAT: BUSPROG: Analytic   STATE: DIS: Information Technology
KEY: Bloom's: Comprehension   TOP: What is a Transaction?

57. If a(n)_____is issued before the termination of a transaction, the DBMS will restore the database only for that particular transaction, rather than for all transactions, in order to maintain the durability of the previous transactions.

ANSWER: ROLLBACK
PTS: 1   DIF: Difficulty: Moderate   REF: p.489
NAT: BUSPROG: Analytic   STATE: DIS: Information Technology
KEY: Bloom's: Comprehension   TOP: What is a Transaction?

58. The objective of_____control is to ensure the serializability of transactions in a multiuser database environment.

ANSWER: concurrency
PTS: 1   DIF: Difficulty: Easy   REF: p.490
NAT: BUSPROG: Technology   STATE: DIS: Information Technology
KEY: Bloom's: Knowledge   TOP: Concurrency Control

59. The_____. occurs when two concurrent transactions, T1 and T2, are updating the same data element and one of the updates is lost.

ANSWER: lost update problem
PTS: 1   DIF: Difficulty: Easy   REF: p.490
NAT: BUSPROG: Technology   STATE: DIS: Information Technology
KEY: Bloom's: Knowledge   TOP: Concurrency Control

60. The scheduler's main job is to create a(n)_____of a transaction's operation, in which the interleaved executions of transactions yield the same results as if the transactions were executed in serial order.

ANSWER: serializable schedule
PTS: 1   DIF: Difficulty: Easy   REF: p.494
NAT: BUSPROG: Technology   STATE: DIS: Information Technology
KEY: Bloom's: Knowledge   TOP: Concurrency Control

61. The_____interleaves the execution of database operations to ensure serializability.

ANSWER: scheduler
PTS: 1   DIF: Difficulty: Easy   REF: p.494
NAT: BUSPROG: Technology   STATE: DIS: Information Technology
KEY: Bloom's: Knowledge   TOP: Concurrency Control

62. To determine the appropriate order of the operations, the scheduler bases its actions on concurrency control algorithms, such as_____or time stamping methods.

ANSWER: locking
PTS: 1   DIF: Difficulty: Easy   REF: p.494
NAT: BUSPROG: Technology   STATE: DIS: Information Technology
KEY: Bloom's: Knowledge   TOP: Concurrency Control

63. Most multiuser_____automatically initiate and enforce locking procedures, where all locking information is managed by the lock manager.

ANSWER: DBMSs
          database management systems
          database management systems (DBMSs)
PTS: 1   DIF: Difficulty: Easy   REF: p.495
NAT: BUSPROG: Technology   STATE: DIS: Information Technology
KEY: Bloom's: Knowledge   TOP: Concurrency Control with Locking
                                                         Methods

64. _____can take place at any of the following levels: database, table, page, row, or field.

ANSWER: Locking
PTS: 1   DIF: Difficulty: Easy   REF: p.496
NAT: BUSPROG: Technology   STATE: DIS: Information Technology
KEY: Bloom's: Knowledge   TOP: Concurrency Control with Locking
                                                         Methods

65. _____-level locks are less restrictive than database-level locks, but they create traffic jams when many transactions are waiting to access the same table.

ANSWER: Table
PTS: 1   DIF: Difficulty: Easy   REF: p.496
NAT: BUSPROG: Technology   STATE: DIS: Information Technology
KEY: Bloom's: Knowledge   TOP: Concurrency Control with Locking
                                                         Methods

66. As a rule, a(n)_____must unlock the object after its termination.

ANSWER: transaction
PTS: 1   DIF: Difficulty: Easy   REF: p.498
NAT: BUSPROG: Technology   STATE: DIS: Information Technology
KEY: Bloom's: Knowledge   TOP: Concurrency Control with Locking
                                                             Methods

67. The_____rule states that only one transaction at a time can own an exclusive lock on the same object.

ANSWER: mutual exclusive
PTS: 1   DIF: Difficulty: Easy   REF: p.499
NAT: BUSPROG: Technology   STATE: DIS: Information Technology
KEY: Bloom's: Knowledge   TOP: Concurrency Control with Locking
                                                             Methods

68. If T1 has not unlocked data item Y, T2 cannot begin; if T2 has not unlocked data item X, T1 cannot continue. Consequently, T1 and T2 each wait for the other to unlock the required data item. Such a deadlock is also known as a(n) _____.

ANSWER: deadly embrace
PTS: 1   DIF: Difficulty: Easy   REF: p.500-501
NAT: BUSPROG: Technology   STATE: DIS: Information Technology
KEY: Bloom's: Knowledge   TOP: Concurrency Control with Locking
                                                             Methods

69. Uniqueness ensures that no equal time stamp values can exist, and_____ensures that time stamp values always increase.

ANSWER: monotonicity
PTS: 1   DIF: Difficulty: Easy   REF: p.502
NAT: BUSPROG: Technology   STATE: DIS: Information Technology
KEY: Bloom's: Knowledge   TOP: Concurrency Control with Time Stamping
                                                             Methods

70. In a heavily used database management system (DBMS), the prevention and detection of_____constitutes an important DBMS function.

ANSWER: deadlocks
PTS: 1   DIF: Difficulty: Easy   REF: p.504
NAT: BUSPROG: Technology   STATE: DIS: Information Technology
KEY: Bloom's: Knowledge   TOP: Concurrency Control with Optimistic
                                                             Methods

71. _____ensure that a disk physical failure will not impair the DBMS's ability to recover data.

ANSWER: Redundant transaction logs
PTS: 1   DIF: Difficulty: Easy   REF: p.506
NAT: BUSPROG: Technology   STATE: DIS: Information Technology
KEY: Bloom's: Knowledge   TOP: Database Recovery Management

72. Database transaction_____restores a database from an inconsistent state to a previously consistent state.

ANSWER: recovery
PTS: 1   DIF: Difficulty: Easy   REF: p.506
NAT: BUSPROG: Technology   STATE: DIS: Information Technology
KEY: Bloom's: Knowledge   TOP: Database Recovery Management

73. What is transaction isolation and why it is important?

ANSWER: Isolation means that the data used during the execution of a transaction cannot be used by a second
transaction until the first one is completed. In other words, if transaction T1 is being executed and
is using the data item X, that data item cannot be accessed by any other transaction (T2 ... Tn) until
T1 ends. This property is particularly useful in multiuser database environments because several
users can access and update the database at the same time.

PTS: 1   DIF: Difficulty: Moderate   REF: p.487
NAT: BUSPROG: Analytic   STATE: DIS: Information Technology
KEY: Bloom's: Comprehension   TOP: What is a Transaction?

74. Explain the transaction log. What is its function?

ANSWER: A DBMS uses a transaction log to keep track of all transactions that update the database. The
DBMS uses the information stored in this log for a recovery requirement triggered by a
ROLLBACK statement, a program's abnormal termination, or a system failure such as a network
discrepancy or a disk crash.
PTS: 1   DIF: Difficulty: Moderate   REF: p.489
NAT: BUSPROG: Analytic   STATE: DIS: Information Technology
KEY: Bloom's: Comprehension   TOP: What is a Transaction?

75. How does a shared/exclusive lock schema increase the lock manager's overhead?

ANSWER: The type of lock held must be known before a lock can be granted.
Three lock operations exist: READ_LOCK to check the type of lock, WRITE_LOCK to issue the
lock, and UNLOCK to release the lock.

The schema has been enhanced to allow a lock upgrade from shared to exclusive and a lock
downgrade from exclusive to shared.

PTS: 1   DIF: Difficulty: Moderate   REF: p.500
NAT: BUSPROG: Analytic   STATE: DIS: Information Technology
KEY: Bloom's: Comprehension   TOP: Concurrency Control with Locking
                                                         Methods

76. What are the three basic techniques to control deadlocks?

ANSWER: 1. Deadlock prevention. A transaction requesting a new lock is aborted when there is the possibility
that a deadlock can occur. If the transaction is aborted, all changes made by this transaction are
rolled back and all locks obtained by the transaction are released. The transaction is then
rescheduled for execution. Deadlock prevention works because it avoids the conditions that lead
to deadlocking.

2. Deadlock detection. The DBMS periodically tests the database for deadlocks. If a deadlock is found, the "victim" transaction is aborted (rolled back and restarted) and the other transaction continues.

3. Deadlock avoidance. The transaction must obtain all of the locks it needs before it can be executed. This technique avoids the rolling back of conflicting transactions by requiring that locks be obtained in succession. However, the serial lock assignment required in deadlock avoidance increases action response times.

PTS: 1   DIF: Difficulty: Moderate   REF: p.502
NAT: BUSPROG: Analytic   STATE: DIS: Information Technology
KEY: Bloom's: Comprehension   TOP: Concurrency Control with Locking
                                                    Methods

77. What are database checkpoints?

ANSWER: Database checkpoints are operations in which the DBMS writes all of its updated buffers to disk. While this is happening, the DBMS does not execute any other requests. A checkpoint operation is also registered in the transaction log. As a result of this operation, the physical database and the transaction log will be in sync. This synchronization is required because update operations update the copy of the data in the buffers and not in the physical database. Checkpoints are automatically scheduled by the DBMS several times per hour. Checkpoints also play an important role in transaction recovery

PTS: 1   DIF: Difficulty: Moderate   REF: p.507
NAT: BUSPROG: Analytic   STATE: DIS: Information Technology
KEY: Bloom's: Comprehension   TOP: Database Recovery Management

78. How do transaction recovery procedures use the deferred-write and write-through techniques to recover transactions?

ANSWER: The database recovery process involves bringing the database to a consistent state after a failure. Transaction recovery procedures generally make use of deferred-write and write-through techniques.

When the recovery procedure uses a deferred-write technique, the transaction operations do not immediately update the physical database. Instead, only the transaction log is updated. The database is physically updated only after the transaction reaches its commit point, using information from the transaction log. If the transaction aborts before it reaches its commit point, no changes need to be made to the database because it was never updated. The recovery process for all started and committed transactions follows these steps:

1. Identify the last checkpoint in the transaction log. This is the last time transaction data were physically saved to disk.

2. For a transaction that started and was committed before the last checkpoint, nothing needs to be done because the data are already saved.

3. For a transaction that performed a commit operation after the last checkpoint, the DBMS uses the transaction log records to redo the transaction and update the database, using the "after" values in the transaction log. The changes are made in ascending order, from oldest to newest.

4. For any transaction that had a ROLLBACK operation after the last checkpoint or that was left active before the failure occurred, nothing needs to be done because the database was never updated.

When the recovery procedure uses a write-through technique, the database is immediately updated by transaction operations during the transaction's execution, even before the transaction reaches its commit point. If the transaction aborts before it reaches its commit point, a ROLLBACK or undo operation needs to be done to restore the database to a consistent state. In that case, the ROLLBACK operation will use the transaction log "before" values. The recovery process follows these steps:

1. Identify the last checkpoint in the transaction log. This is the last time transaction data were physically saved to disk.

2. For a transaction that started and was committed before the last checkpoint, nothing needs to be done because the data are already saved.

3. For a transaction that was committed after the last checkpoint, the DBMS redoes the transaction, using the "after" values of the transaction log. Changes are applied in ascending order, from oldest to newest.

4. For any transaction that had a ROLLBACK operation after the last checkpoint or that was left active before the failure occurred, the DBMS uses the transaction log records to ROLLBACK or undo the operations, using the "before" values in the transaction log. Changes are applied in reverse order, from newest to oldest.

PTS: 1   DIF: Difficulty: Moderate   REF: p.507-508
NAT: BUSPROG: Analytic   STATE: DIS: Information Technology
KEY: Bloom's: Comprehension   TOP: Database Recovery Management