CHAPTER 10: TRANSACTION MANAGEMENT AND CONCURRENCY CONTROL

1. Most real-world database transactions are formed by only one database request.
   1. True
   2. 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?

1. Although the DBMS is designed to recover a database to a previous consistent state when an interruption preventsthe completion of a required set of transactions, the transactions themselves are defined by the end user orprogrammer and must be semantically correct.
   1. True
   2. 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?

1. The DBMS guarantees that the semantic meaning of a transaction truly represents the real-world event.
   1. True
   2. 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?

1. Atomicity indicates the permanence of the database's consistent state.
   1. True
   2. 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?

1. Serializability means that data used during the execution of a transaction cannot be used by a second transaction untilthe first one is completed.
   1. True
   2. 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?

1. Incomplete or improper transactions can have a devastating effect on database integrity.
   1. True
   2. 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?

1. Durability requires that all portions of the transaction must be treated as a single, logical unit of work in which alloperations are applied and completed to produce a consistent database.
   1. True
   2. 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?

1. The multiuser DBMS must implement controls to ensure serializability and isolation of transactions, in addition toatomicity and durability, in order to guard the database's consistency and integrity.
   1. True
   2. 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?

1. The phenomenon of uncommitted data occurs when two transactions are executed concurrently and the firsttransaction is rolled back after the second transaction has already accessed the uncommitted data—thus violating theisolation property of transactions.
   1. True
   2. 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

1. The scheduler establishes the order in which the operations within concurrent transactions are executed.
   1. True
   2. 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

1. A scheduler facilitates data isolation to ensure that two transactions do not update the same data element at thesame time.
   1. True
   2. 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

1. A lock guarantees the open use of a data item to multiple transactions.
   1. True
   2. 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

1. In a page-level lock, the DBMS will lock an entire diskpage.
   1. True
   2. 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?

1. A field-level lock allows concurrent transactions to access the same row, as long as they require the use of differentfields within that row.
   1. True
   2. 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

1. A shared lock produces no conflict as long as all the concurrent transactions are read-write only.
   1. True
   2. 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

1. A growing phase in a two-phase lock is when a transaction acquires all the required locks without locking any data.
   1. True
   2. 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

1. Timestamps must only have the single property of uniqueness.
   1. True
   2. 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

1. Time stamping demands a lot of system resources because many transactions might have to be stopped,rescheduled, and stamped.
   1. True
   2. 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

1. An optimistic approach is based on the assumption that the majority of the database operations do not conflict.
   1. True
   2. 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

1. When using an optimistic approach, during the read phase, a transaction reads the database, executes the neededcomputations, and makes the updates to a private copy of the database values.
   1. True
   2. 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

1. The serializable isolation level is the least restrictive level defined by the ANSI SQL standard.
   1. True
   2. 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

1. The reason for the different levels of isolation is to increase transaction concurrency.
   1. True
   2. 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

1. The transaction recovery write-ahead-log protocol ensures that transaction logs are always written before anydatabase data are actually updated.
   1. True
   2. 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

1. The last step in the write-through technique recovery procedure is to identify the last checkpoint in the transactionlog.
   1. True
   2. 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

1. A transaction is a unit of work that must be either entirely completed or aborted.
   1. 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?

1. A consistent database state is .
   1. 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?

1. requires that all operations of a transaction be completed.
   1. 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?

1. means that data used during the execution of a transaction cannot be used by a second transaction until thefirst one is completed.
   1. 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?

1. A single-user database system automatically ensures of the database, because only one transaction isexecuted at a time.
   1. 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?

1. The ANSI has defined standards that govern SQL database transactions. Transaction support is provided by twoSQL statements: and ROLLBACK.
   1. 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?

1. ANSI defines four events that signal the end of a transaction. Of the following events, which is defined by ANSI asbeing equivalent to a COMMIT?
   1. 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?

1. ANSI defines four events that signal the end of a transaction. Of the following events, which is defined by ANSI asbeing equivalent to a ROLLBACK?
   1. 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?

1. The implicit beginning of a transaction is .
   1. 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?

1. 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.
   1. 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?

1. One of the three most common data integrity and consistency problems is .
   1. 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

1. occurs when a transaction accesses data before and after one or more other transactions finish working withsuch data.
   1. 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

1. As long as two transactions, T1 and T2, access data, there is no conflict, and the order of execution isirrelevant to the final outcome.
   1. 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: ConcurrencyControl

1. are required to prevent another transaction from reading inconsistent data.
   1. 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

1. The\_\_\_\_\_\_ manager is responsible for assigning and policing the locks used by the transactions.
   1. 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

1. Lock indicates the level of lock use.
   1. 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

1. A lock locks the entire table preventing access to any row by a transaction while another transaction is usingthe table.
   1. 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

1. A lock locks the entire diskpage.
   1. 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

1. A diskpage, or page, is the equivalent of a .
   1. 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

1. A lock allows concurrent transactions to access different rows of the same table.
   1. 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

1. A(n) specifically reserves access to the transaction that locked the object.
   1. 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

1. A(n) lock exists when concurrent transactions are granted read access on the basis of a common lock.
   1. 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

1. What is a rule that applies to the two-phase locking protocol?
   1. Two transactions cannot haveconflicting locks.
   2. No unlock operation can precede a lock operation in a different transaction.
   3. No data is affected until all locks are released.
   4. 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

1. A(n) phase in a two-phase lock is when a transaction releases all locks and cannot obtain any new lock.
   1. 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

1. A(n) condition occurs when two or more transactions wait for each other to unlock data.
   1. 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

1. The approach to scheduling concurrent transactions assigns a global unique stamp to each transaction.
   1. 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

1. In the wait/die scheme,:
   1. the older transaction rolls back the youngertransaction and reschedules it.
   2. the younger, preempted transaction is rescheduled using the same time stamp.
   3. the older transaction waits for the younger one to complete and release its locks.
   4. 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

1. In the optimistic approach, during the phase, a transaction scans the database, executes the neededcomputations, and makes the updates to a private copy of the database values.
   1. 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

1. In the optimistic approach, during the phase, changes are permanently applied to the database.
   1. 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

1. The isolation level ensures that queries return consistent results.
   1. 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

1. 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.
   1. 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

1. Although the DBMS is designed to recover a database to a previous consistent state when an interruption preventsthe completion of a required set of transactions, the transactions themselves are defined by the end user orprogrammer 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?

1. If a(n) is issued before the termination of a transaction, the DBMS will restore the database only for thatparticular 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?

1. 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

1. The . occurs when two concurrent transactions, T1 and T2, are updating the same data element and one of theupdates 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

1. 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

1. 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

1. To determine the appropriate order of the operations, the scheduler bases its actions on concurrency controlalgorithms, 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

1. Most multiuser automatically initiate and enforce locking procedures, where all locking information ismanaged 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

1. 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

1. -level locks are less restrictive than database-level locks, but they create traffic jams when many transactionsare 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

1. 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

1. 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

1. 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 asa(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

1. Uniqueness ensures that no equal time stamp values can exist, and ensures that time stamp values alwaysincrease.

*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

1. In a heavily used database management system (DBMS), the prevention and detection of constitutes animportant 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

1. 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

1. 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

1. 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 secondtransaction until the first one is completed. In other words, if transaction T1 is being executed and isusing the data item X, that data item cannot be accessed by any other transaction (T2 ... Tn) until T1ends. This property is particularly useful in multiuser database environments because several users canaccess 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?

1. 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 DBMSuses 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?

1. 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 downgradefrom 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

1. 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 possibilitythat a deadlock can occur. If the transaction is aborted, all changes made by this transaction arerolled back and all locks obtained by the transaction are released. The transaction is thenrescheduled for execution. Deadlock prevention works because it avoids the conditions that leadto deadlocking.

1. Deadlock detection. The DBMS periodically tests the database for deadlocks. If a deadlock isfound, the “victim” transaction is aborted (rolled back and restarted) and the other transactioncontinues.
2. Deadlock avoidance. The transaction must obtain all of the locks it needs before it can beexecuted. This technique avoids the rolling back of conflicting transactions by requiring that locksbe obtained in succession. However, the serial lock assignment required in deadlock avoidanceincreases 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

1. What are database checkpoints?

*ANSWER:* Database checkpoints are operations in which the DBMS writes all of its updated buffers to disk. Whilethis is happening, the DBMS does not execute any other requests. A checkpoint operation is alsoregistered in the transaction log. As a result of this operation, the physical database and the transactionlog will be in sync. This synchronization is required because update operations update the copy of thedata in the buffers and not in the physical database. Checkpoints are automatically scheduled by theDBMS 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

1. How do transaction recovery procedures use the deferred-write and write-through techniques to recovertransactions?

*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 notimmediately update the physical database. Instead, only the transaction log is updated. The database isphysically updated only after the transaction reaches its commit point, using information from thetransaction log. If the transaction aborts before it reaches its commit point, no changes need to be madeto the database because it was never updated. The recovery process for all started and committedtransactions follows these steps:

1. Identify the last checkpoint in the transaction log. This is the last time transaction data were physicallysaved to disk.
2. For a transaction that started and was committed before the last checkpoint, nothing needs to be donebecause the data are already saved.
3. For a transaction that performed a commit operation after the last checkpoint, the DBMS uses thetransaction log records to redo the transaction and update the database, using the “after” values in thetransaction 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 activebefore 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 bytransaction operations during the transaction’s execution, even before the transaction reaches its commitpoint. If the transaction aborts before it reaches its commit point, a ROLLBACK or undo operationneeds to be done to restore the database to a consistent state. In that case, the ROLLBACK operationwill 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 physicallysaved to disk.
2. For a transaction that started and was committed before the last checkpoint, nothing needs to be donebecause 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 tonewest.
4. For any transaction that had a ROLLBACK operation after the last checkpoint or that was left activebefore the failure occurred, the DBMS uses the transaction log records to ROLLBACK or undo theoperations, using the “before” values in the transaction log. Changes are applied in reverse order, fromnewest 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