CHAPTER 11: DATABASE PERFORMANCE TUNING AND QUERY OPTIMIZATION

1. One of the main functions of a database system is to provide timely answers to end users.
   1. True
   2. False

*ANSWER:* True

PTS*:* 1 DIF: Difficulty: Easy REF: p.516

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: Database Performance-Tuning Concepts

1. Good database performance is easy to evaluate.
   1. True
   2. False

*ANSWER:* False

PTS*:* 1 DIF: Difficulty: Easy REF: p.516

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: Database Performance-Tuning Concepts

1. All factors must be checked to ensure that each system component operates at its optimum level and has sufficientresources to minimize the occurrence of bottlenecks.
   1. True
   2. False

*ANSWER:* True

PTS*:* 1 DIF: Difficulty: Easy REF: p.516

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: Database Performance-Tuning Concepts

1. Good database performance starts with good database design.
   1. True
   2. False

*ANSWER:* True

PTS*:* 1 DIF: Difficulty: Easy REF: p.516

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: Database Performance-Tuning Concepts

1. DBMS implementations are typically similar in complexity to two-tier client/server configurations.
   1. True
   2. False

*ANSWER:* False

PTS*:* 1 DIF: Difficulty: Easy REF: p.518

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: Database Performance-Tuning Concepts

1. A data file can contain rows from a single table alone.
   1. True
   2. False

*ANSWER:* False

PTS*:* 1 DIF: Difficulty: Easy REF: p.518

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: Database Performance-Tuning Concepts

1. The data cache caches system catalog data and the contents of the indexes.
   1. True
   2. False

*ANSWER:* True

PTS*:* 1 DIF: Difficulty: Easy REF: p.519

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: Database Performance-Tuning Concepts

1. The SQL cache stores the end-user written SQL.
   1. True
   2. False

*ANSWER:* False

PTS*:* 1 DIF: Difficulty: Easy REF: p.519

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: Database Performance-Tuning Concepts

1. To work with data, the DBMS must retrieve the data from permanent storage and place it in RAM.
   1. True
   2. False

*ANSWER:* True

PTS*:* 1 DIF: Difficulty: Easy REF: p.519

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: Database Performance-Tuning Concepts

1. The purpose of an I/O operation is to move data to and from different computer components or devices.
   1. True
   2. False

*ANSWER:* True

PTS*:* 1 DIF: Difficulty: Easy REF: p.519

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: Database Performance-Tuning Concepts

1. Working with data in the data cache is many times faster than working with data in the data files.
   1. True
   2. False

*ANSWER:* True

PTS*:* 1 DIF: Difficulty: Easy REF: p.519

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: Database Performance-Tuning Concepts

1. Fully equivalent means that the optimized query results are always the same as the original query.
   1. True
   2. False

*ANSWER:* True

PTS*:* 1 DIF: Difficulty: Easy REF: p.523

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: Query Processing

1. The SQL execution activities are performed by the query optimizer.
   1. True
   2. False

*ANSWER:* False

PTS*:* 1 DIF: Difficulty: Easy REF: p.523

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: Query Processing

1. All transaction management commands are processed during the parsing and execution phases of query processing.
   1. True
   2. False

*ANSWER:* True

PTS*:* 1 DIF: Difficulty: Easy REF: p.524

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: Query Processing

1. An index scan is less efficient than a full table scan.
   1. True
   2. False

*ANSWER:* False

PTS*:* 1 DIF: Difficulty: Easy REF: p.526

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: Indexes and Query Optimization

1. Indexes do not facilitate join operations.
   1. True
   2. False

*ANSWER:* False

PTS*:* 1 DIF: Difficulty: Easy REF: p.526

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: Indexes and Query Optimization

1. Using index characteristics, a database designer can determine the best type of index to use.
   1. True
   2. False

*ANSWER:* True

PTS*:* 1 DIF: Difficulty: Easy REF: p.527

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: Indexes and Query Optimization

1. A cost-based optimizer uses a set of preset rules and points to determine the best approach to execute a query.
   1. True
   2. False

*ANSWER:* False

PTS*:* 1 DIF: Difficulty: Easy REF: p.528

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: Indexes and Query Optimization

1. The primary factor in determining the most efficient access plan is the I/O cost.
   1. True
   2. False

*ANSWER:* True

PTS*:* 1 DIF: Difficulty: Easy REF: p.529

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: Optimizer Choices

1. Most current-generation relational DBMSs perform automatic query optimization at the client end.
   1. True
   2. False

*ANSWER:* False

PTS*:* 1 DIF: Difficulty: Easy REF: p.531

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: SQL Performance Tuning

1. Indexes are very useful in small tables or tables with low sparsity.
   1. True
   2. False

*ANSWER:* False

PTS*:* 1 DIF: Difficulty: Easy REF: p.532

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: SQL Performance Tuning

1. Character field comparisons are faster than numeric, date, and NULL comparisons.
   1. True
   2. False

*ANSWER:* False

PTS*:* 1 DIF: Difficulty: Easy REF: p.533

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: SQL Performance Tuning

1. In-memory database systems are optimized to store small portions of the database in disk storage alone.
   1. True
   2. False

*ANSWER:* False

PTS*:* 1 DIF: Difficulty: Easy REF: p.536

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: DBMS Performance Tuning

1. DBMS performance tuning includes global tasks such as managing the DBMS processes in primary memory andmanaging the structures in physical storage.
   1. True
   2. False

*ANSWER:* True

PTS*:* 1 DIF: Difficulty: Easy REF: p.536

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: DBMS Performance Tuning

1. Maximizing disk contention is one of the general recommendations for the physical storage of databases.
   1. True
   2. False

*ANSWER:* False

PTS*:* 1 DIF: Difficulty: Easy REF: p.537

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: DBMS Performance Tuning

1. RAID systems use a single disk to create storage volumes.
   1. True
   2. False

*ANSWER:* False

PTS*:* 1 DIF: Difficulty: Easy REF: p.537

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: DBMS Performance Tuning

1. On the client side, the objective is to generate an SQL query that returns a correct answer in the least amount oftime, using a minimum amount of resources at the server end. The activities required to achieve this goal arecommonly referred to as tuning.
   1. client SQL b. database SQL

c. SQL performance d. DBMS performance

*ANSWER:* c

PTS*:* 1 DIF: Difficulty: Easy REF: p.517

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: Database Performance-Tuning Concepts

1. On the server side, the database environment must be properly configured to respond to clients' requests in thefastest way possible, while making optimum use of existing resources. The activities required to achieve this goal arecommonly referred to as tuning.
   1. client and server b. database SQL

c. SQL performance d. DBMS performance

*ANSWER:* d

PTS*:* 1 DIF: Difficulty: Easy REF: p.517

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: Database Performance-Tuning Concepts

1. When moving data from permanent storage to RAM, an I**/**O disk operation retrieves:
   1. an entire table. b. an entire physical disk block.

c. only the row containing the attribute requested. d. only the attribute which was requested.

*ANSWER:* b

PTS*:* 1 DIF: Difficulty: Easy REF: p.519

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: Database Performance-Tuning Concepts

1. A DBA determines the initial size of the data files that make up the database; however, as required, the data filescan automatically expand in predefined increments known as .
   1. procedure cache b. buffer cache

c. supplements d. extends

*ANSWER:* d

PTS*:* 1 DIF: Difficulty: Easy REF: p.519

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: Database Performance-Tuning Concepts

1. A(n) is a logical grouping of several data files that store data with similar characteristics.
   1. procedure cache b. table space

c. data cache d. listener

*ANSWER:* b

PTS*:* 1 DIF: Difficulty: Easy REF: p.519

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: Database Performance-Tuning Concepts

1. A system table space, a user data table space, an index table space, and a temporary table space are examples of \_\_\_\_\_.
   1. procedure caches b. file groups

c. data caches d. operation modes

*ANSWER:* b

PTS*:* 1 DIF: Difficulty: Easy REF: p.519

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: Database Performance-Tuning Concepts

1. The data cache is where the data read from the database data files are stored the data have been read or the data are written to the database data files.
   1. after; before b. after; after

c. before; before d. before; after

*ANSWER:* a

PTS*:* 1 DIF: Difficulty: Easy REF: p.519

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: Database Performance-Tuning Concepts

1. To work with data, a DBMS must retrieve the data from and place them in .
   1. data files; procedure cache b. RAM; data cache

c. permanent storage; RAM d. temporary files; procedure cache

*ANSWER:* c

PTS*:* 1 DIF: Difficulty: Easy REF: p.519

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: Database Performance-Tuning Concepts

1. The data cache or is a shared, reserved memory area that stores the most recently accessed data blocks inRAM.
   1. buffer cache b. procedure cache

c. SQL cache d. permanent storage

*ANSWER:* a

PTS*:* 1 DIF: Difficulty: Easy REF: p.519

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: Database Performance-Tuning Concepts

1. The is a shared, reserved memory area that stores the most recently executed SQL statements or PL/SQLprocedures, including triggers and functions.
   1. buffer cache b. procedure cache

c. data cache d. permanent storage

*ANSWER:* b

PTS*:* 1 DIF: Difficulty: Easy REF: p.519

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: Database Performance-Tuning Concepts

1. The process analyzes SQL queries and finds the most efficient way to access data.
   1. optimizer b. scheduler

c. listener d. user

*ANSWER:* a

PTS*:* 1 DIF: Difficulty: Moderate REF: p.520

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: Database Performance-Tuning Concepts

1. To generate database object statistics manually, following syntax should be used in Oracle: .
   1. ANALYZE <TABLE/INDEX> object\_name;
   2. CREATE <TABLE/INDEX> object\_name;
   3. ANALYZE <TABLE/INDEX> object\_name COMPUTE STATISTICS;
   4. CREATE <TABLE/INDEX> object\_name COMPUTE STATISTICS;

*ANSWER:* c

PTS*:* 1 DIF: Difficulty: Moderate REF: p.522

NAT: BUSPROG: Analytic STATE: DISC: Information Technology

KEY: Bloom’s Comprehension TOP: Database Performance-Tuning Concepts

1. Automatic query optimization means that the:
   1. optimization takes place at compilation time by theprogrammer.
   2. DBMS finds the most cost-effective access path without user intervention.
   3. optimization process is scheduled and selected by the end user or programmer.
   4. database access strategy is defined when the program is executed.

*ANSWER:* b

PTS*:* 1 DIF: Difficulty: Easy REF: p.520

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: Database Performance-Tuning Concepts

1. The DBMS the SQL query and chooses the most efficient access/execution plan.
   1. parses b. executes

c. fetches d. processes

*ANSWER:* a

PTS*:* 1 DIF: Difficulty: Easy REF: p.522

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: Query Processing

1. Which of the following is the first step of query processing at the DBMS server end?
   1. Executing b. Parsing

c. Fetching d. Delivering

*ANSWER:* b

PTS*:* 1 DIF: Difficulty: Easy REF: p.522

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: Query Processing

1. The DBMS the data and sends the result set back to the client.
   1. parses b. executes

c. fetches d. processes

*ANSWER:* c

PTS*:* 1 DIF: Difficulty: Easy REF: p.522

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: Query Processing

1. If there is no index, the DBMS will perform a scan.
   1. loop b. range

c. row ID table access d. full table

*ANSWER:* d

PTS*:* 1 DIF: Difficulty: Easy REF: p.527

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: Indexes and Query Optimization

1. refers to the number of different values a column could possibly have.
   1. Database statistics b. Data sparsity

c. A bitmap index d. Clustering

*ANSWER:* b

PTS*:* 1 DIF: Difficulty: Easy REF: p.527

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: Indexes and Query Optimization

1. Bitmap indexes tend to use less space than a because they use bits instead of bytes to store their data.
   1. hash index b. sparse index

c. B-tree index d. reverse index

*ANSWER:* c

PTS*:* 1 DIF: Difficulty: Easy REF: p.527

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: Indexes and Query Optimization

1. Knowing the sparsity of a column helps you decide whether the use of is appropriate.
   1. query processing b. query optimization

c. an index d. a full table scan

*ANSWER:* c

PTS*:* 1 DIF: Difficulty: Easy REF: p.527

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: Indexes and Query Optimization

1. is the central activity during the parsing phase in query processing.
   1. Clustering b. Partitioning

c. Query validation d. Query optimization

*ANSWER:* d

PTS*:* 1 DIF: Difficulty: Easy REF: p.528

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: Optimizer Choices

1. When setting optimizer hints, instructs the optimizer to minimize the overall execution time, that is, to minimizethe time it takes to return the total number of rows in the query result set. This hint is generally used for batch modeprocesses.
   1. ALL\_ROWS b. FIRST\_ROWS

c. INDEX(P\_QOH\_NDX) d. OPTIMIZATION\_ROWS

*ANSWER:* a

PTS*:* 1 DIF: Difficulty: Moderate REF: p.531

NAT: BUSPROG: Analytic STATE: DISC: Information Technology

KEY: Bloom’s Comprehension TOP: Optimizer Choices

1. In standard SQL, the optimizer hint FIRST\_ROWS is generally used for mode processes.
   1. batch b. interactive

c. transaction d. real-time

*ANSWER:* b

PTS*:* 1 DIF: Difficulty: Easy REF: p.531

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: Optimizer Choices

1. In standard SQL, the optimizer hint ALL\_ROWS is generally used for mode processes.
   1. interactive b. real-time

c. batch d. transaction

*ANSWER:* c

PTS*:* 1 DIF: Difficulty: Easy REF: p.531

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: Optimizer Choices

1. The LIKE conditional operator is used by the OPERAND1.
   1. P\_PRICE b. V\_STATE

c. P\_QOH d. V\_CONTACT

*ANSWER:* d

PTS*:* 1 DIF: Difficulty: Easy REF: p.533

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: SQL Performance Tuning

1. The must be set large enough to permit as many data requests to be serviced from cache as possible.
   1. data cache b. SQL cache

c. sort cache d. optimizer mode

*ANSWER:* a

PTS*:* 1 DIF: Difficulty: Easy REF: p.536

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: DBMS Performance Tuning

1. The majority of primary memory resources will be allocated to the cache.
   1. data b. SQL

c. sort d. optimizer

*ANSWER:* a

PTS*:* 1 DIF: Difficulty: Easy REF: p.536

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: DBMS Performance Tuning

1. The cache is used as a temporary storage area for ORDER BY or GROUP BY operations, as well as forindex-creation functions.
   1. data b. SQL

c. sort d. optimizer

*ANSWER:* c

PTS*:* 1 DIF: Difficulty: Easy REF: p.536

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: DBMS Performance Tuning

1. From the performance point of view, databases eliminate disk access bottlenecks.
   1. RAID b. distributed

c. index-organized d. in-memory

*ANSWER:* d

PTS*:* 1 DIF: Difficulty: Easy REF: p.536

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: DBMS Performance Tuning

1. The table space is used for transaction-recovery purposes.
   1. system b. user data

c. temporary d. rollback segment

*ANSWER:* d

PTS*:* 1 DIF: Difficulty: Easy REF: p.537

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: DBMS Performance Tuning

1. In the context of RAID levels, refers to writing the same data blocks to separate drives.
   1. striping b. mirroring

c. partitioning d. aggregating

*ANSWER:* b

PTS*:* 1 DIF: Difficulty: Easy REF: p.537

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: DBMS Performance Tuning

1. The table space is used to store the data dictionary tables.
   1. system b. user data

c. temporary d. rollback segment

*ANSWER:* a

PTS*:* 1 DIF: Difficulty: Easy REF: p.537

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: DBMS Performance Tuning

1. In the context of RAID levels, striped arrays provide:
   1. increased read performance and fault tolerance. b. increased fault tolerance but decreased performance.
2. increased read performance but no faulttolerance. d. neither fault tolerance nor good performance.

*ANSWER:* c

PTS*:* 1 DIF: Difficulty: Moderate REF: p.537

NAT: BUSPROG: Analytic STATE: DISC: Information Technology

KEY: Bloom’s Comprehension TOP: DBMS Performance Tuning

1. In RAID level 5,:
   1. the data and the parity data are striped acrossseparate drives.
   2. the data blocks are spread over separate drives and are duplicated.
   3. the array requires a minimum of two drives and is known as a striped array.
   4. the array requires a minimum of five drives and is known as duplexing.

*ANSWER:* a

PTS*:* 1 DIF: Difficulty: Easy REF: p.537

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: DBMS Performance Tuning

1. End users and the DBMS interact through the use of to generate information.

*ANSWER:* queries

PTS*:* 1 DIF: Difficulty: Easy REF: p.516

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: Database Performance-Tuning Concepts

1. A system will perform best when its hardware and software resources are .

*ANSWER:* optimized

PTS*:* 1 DIF: Difficulty: Easy REF: p.516

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: Database Performance-Tuning Concepts

1. Database activities can be divided into those taking place either on the client side or on the server side.

*ANSWER:* performance tuning

PTS*:* 1 DIF: Difficulty: Easy REF: p.517

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: Database Performance-Tuning Concepts

1. is another name for table space.

*ANSWER:* File group

PTS*:* 1 DIF: Difficulty: Easy REF: p.519

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: Database Performance-Tuning Concepts

1. A(n) request is a low-level read or write data access operation to or from computer devices.

*ANSWER:* input**/**output

I**/**O

PTS*:* 1 DIF: Difficulty: Easy REF: p.519

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: Database Performance-Tuning Concepts

1. DBMS query processing has phases.

*ANSWER:* 3

three

PTS*:* 1 DIF: Difficulty: Easy REF: p.522

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: Query Processing

1. The analyzes the SQL query and finds the most efficient way to access the data.

*ANSWER:* query optimizer

PTS*:* 1 DIF: Difficulty: Easy REF: p.523

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: Query Processing

1. Once an SQL statement is transformed, the DBMS creates what is commonly known as a(n) plan.

*ANSWER:* access

execution

PTS*:* 1 DIF: Difficulty: Easy REF: p.524

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: Query Processing

1. are ordered sets of values that are crucial in speeding up data access.

*ANSWER:* indexes

PTS*:* 1 DIF: Difficulty: Easy REF: p.526

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: Indexes and Query Optimization

1. A is good for simple and fast lookup operations based on equality conditions.

*ANSWER:* hash index

PTS*:* 1 DIF: Difficulty: Easy REF: p.527

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: Indexes and Query Optimization

1. \_\_\_\_\_\_\_\_\_is evaluated based on client perspective.

*ANSWER:* SQL performance tuning

PTS*:* 1 DIF: Difficulty: Easy REF: p.531

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: SQL Performance Tuning

1. is a measure of the likelihood that an index will be used in query processing.

*ANSWER:* Index selectivity

PTS*:* 1 DIF: Difficulty: Easy REF: p.532

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: SQL Performance Tuning

1. A (n)\_\_\_\_ is an index based on a specific SQL function or expression.

*ANSWER:* function-based index

PTS*:* 1 DIF: Difficulty: Easy REF: p.532

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: SQL Performance Tuning

1. A conditional expression is normally expressed within the or HAVING clauses of a SQL statement.

*ANSWER:* WHERE

PTS*:* 1 DIF: Difficulty: Easy REF: p.533

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: SQL Performance Tuning

1. helps provide a balance between performance and fault tolerance.

*ANSWER:* RAID

Redundant array of independent disks

RAID (redundant array of independent disks)

PTS*:* 1 DIF: Difficulty: Easy REF: p.537

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: DBMS Performance Tuning

1. The table space is the most frequently accessed table space and should be stored in its own volume.

*ANSWER:* system

PTS*:* 1 DIF: Difficulty: Easy REF: p.537

NAT: BUSPROG: Technology STATE: DISC: Information Technology

KEY: Bloom’s Knowledge TOP: DBMS Performance Tuning

1. List and describe some typical DBMS processes.

*ANSWER:* Listener: The listener process listens for clients’ requests and handles the processing of the SQLrequests to other DBMS processes. Once a request is received, the listener passes the request to theappropriate user process.

User: The DBMS creates a user process to manage each client session. Therefore, when users log on tothe DBMS, they are assigned a user process. This process handles all requests the users submit to theserver. There are many user processes—at least one per logged­in client.

Scheduler: The scheduler process organizes the concurrent execution of SQL requests.

Lock manager: This process manages all locks placed on database objects, including disk pages.

Optimizer: The optimizer process analyzes SQL queries and finds the most efficient way to access thedata.

PTS*:* 1 DIF: Difficulty: Moderate REF: p.519-520

NAT: BUSPROG: Analytic STATE: DISC: Information Technology

KEY: Bloom’s Comprehension TOP: Database Performance-Tuning Concepts

1. Describe query optimization and the modes that an optimizer can operate in.

*ANSWER:* Query optimization is the central activity during the parsing phase in query processing. In this phase, theDBMS must choose what indexes to use, how to perform join operations, which table to use first, and soon. Each DBMS has its own algorithms for determining the most efficient way to access the data. Thequery optimizer can operate in one of two modes:

A rule-based optimizer uses preset rules and points to determine the best approach to execute a query.The rules assign a “fixed cost” to each SQL operation; the costs are then added to yield the cost of theexecution plan. For example, a full table scan has a set cost of 10, while a table access by row ID has aset cost of 3.

A cost-based optimizer uses sophisticated algorithms based on statistics about the objects being accessedto determine the best approach to execute a query. In this case, the optimizer process adds up theprocessing cost, the I/O costs, and the resource costs (RAM and temporary space) to determine thetotal cost of a given execution plan.

PTS*:* 1 DIF: Difficulty: Moderate REF: p.528-529

NAT: BUSPROG: Analytic STATE: DISC: Information Technology

KEY: Bloom’s Comprehension TOP: Optimizer Choices

1. Why do we need to optimize a DBMS with SQL performance tuning, even though they automatically optimize SQLqueries?

*ANSWER:* There is considerable room for improvement since the DBMS uses general optimization techniquesrather than focus on specific techniques dictated by the special circumstances of the query execution. Apoorly written SQL query can, and usually will, bring the database system to its knees from aperformance point of view. The majority of current database performance problems are related to poorlywritten SQL code. Therefore, although a DBMS provides general optimizing services, a carefully writtenquery almost always outperforms a poorly written one.

PTS*:* 1 DIF: Difficulty: Moderate REF: p.531

NAT: BUSPROG: Analytic STATE: DISC: Information Technology

KEY: Bloom’s Comprehension TOP: SQL Performance Tuning

1. How can queries be written to perform the fastest when equality and inequality comparisons are needed?

*ANSWER:* Equality comparisons are generally faster than inequality comparisons. For example, P\_PRICE = 10.00is processed faster because the DBMS can do a direct search using the index in the column. If there areno exact matches, the condition is evaluated as false. However, if an inequality symbol (>, >=, <, <=) isused, the DBMS must perform additional processing to complete the request, because there will almostalways be more “greater than” or “less than” values in the index than “equal” values. With the exceptionof NULL, the slowest of all comparison operators is LIKE with wildcard symbols, as in V\_CONTACTLIKE “%glo%”. Also, using the “not equal” symbol (<>) yields slower searches, especially when thesparsity of the data is high—that is, when there are many more different values than there are equalvalues.

PTS*:* 1 DIF: Difficulty: Moderate REF: p.533

NAT: BUSPROG: Analytic STATE: DISC: Information Technology

KEY: Bloom’s Comprehension TOP: SQL Performance Tuning

1. Summarize the steps required to formulate a query.

*ANSWER:* Queries are usually written to answer questions. In order to formulate a query, the following steps areused.

1. Identify what columns and computations are required:

The first step is needed to determine those required data values that are to be returned. For example,one must determine if names and addresses alone need to be returned or is there a need to includecomputations as well while returning the output. Another important note in the first step is that thecolumns in the SELECT statement should return single values.

1. Identify the source tables:

Once the required columns are identified, the source tables used in the query can be determined. Ifcertain attributes appear in more than one table try to use the least number of tables in the query tominimize the number of join operations.

1. Determine how to join the tables:

Once the tables needed in the query statement are determined, one needs to properly identify how to jointhe tables. In most cases, a natural join is used, but occasionally an outer join is used.

1. Determine what selection criteria is used:

Most queries involve some type of selection criteria. In this case, the operators and operands that areneeded by the criteria are determined. The correct data type and the granularity of data in thecomparison of criteria need to be ensured.

1. Determine the order in which to display the output:

In the final stage, the required output might be ordered by one or more columns. The ORDER BYclause is particularly used to order the required output in this way but is a very resource-intensiveoperation for the DBMS.

PTS*:* 1 DIF: Difficulty: Moderate REF: p.535

NAT: BUSPROG: Analytic STATE: DISC: Information Technology

KEY: Bloom’s Comprehension TOP: Query Formulation

1. How should storage volumes be allocated for indexes, system, and high-usage tables?

*ANSWER:* Assign separate data files in separate storage volumes for the indexes, system, and high-usage tables.This ensures that index operations will not conflict with end-user data or data dictionary table accessoperations. Another advantage of this approach is that different disk block sizes in different volumes canbe used. For example, the data volume can use a 16 K block size, while the index volume can use an 8 Kblock size. Remember that the index record size is generally smaller, and by changing the block size,contention is reduced and I**/**O operations are minimized. This is very important; many databaseadministrators overlook indexes as a source of contention. By using separate storage volumes anddifferent block sizes, the I**/**O operations on data and indexes will happen asynchronously; moreimportantly, the likelihood of write operations blocking read operations is reduced, as page locks tend tolock fewer records.

PTS*:* 1 DIF: Difficulty: Moderate REF: p.538

NAT: BUSPROG: Analytic STATE: DISC: Information Technology

KEY: Bloom’s Comprehension TOP: DBMS Performance Tuning