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.
   a. True
   b. 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

2. Good database performance is easy to evaluate.
   a. True
   b. 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

3. All factors must be checked to ensure that each system component operates at its optimum level and has sufficient resources to minimize the occurrence of bottlenecks.
   a. True
   b. 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

4. Good database performance starts with good database design.
   a. True
   b. 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

5. DBMS implementations are typically similar in complexity to two-tier client/server configurations.
   a. True
   b. 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

6. A data file can contain rows from a single table alone.
   a. True
   b. 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

7. The data cache caches system catalog data and the contents of the indexes.
   a. True
   b. 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

8. The SQL cache stores the end-user written SQL.
   a. True
   b. 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

9. To work with data, the DBMS must retrieve the data from permanent storage and place it in RAM.
   a. True
   b. 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

10. The purpose of an I/O operation is to move data to and from different computer components or devices.
    a. True
    b. 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

11. Working with data in the data cache is many times faster than working with data in the data files.
    a. True
    b. 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

12. Fully equivalent means that the optimized query results are always the same as the original query.
    a. True
    b. 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

13. The SQL execution activities are performed by the query optimizer.
    a. True
    b. 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

14. All transaction management commands are processed during the parsing and execution phases of query processing.
    a. True
    b. 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

15. An index scan is less efficient than a full table scan.
    a. True
    b. 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

16. Indexes do not facilitate join operations.
    a. True
    b. 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

17. Using index characteristics, a database designer can determine the best type of index to use.
    a. True
    b. 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

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

19. The primary factor in determining the most efficient access plan is the I/O cost.
    a. True
    b. 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

20. Most current-generation relational DBMSs perform automatic query optimization at the client end.
    a. True
    b. 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

21. Indexes are very useful in small tables or tables with low sparsity.
    a. True
    b. 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

22. Character field comparisons are faster than numeric, date, and NULL comparisons.
    a. True
    b. 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

23. In-memory database systems are optimized to store small portions of the database in disk storage alone.
    a. True
    b. 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

24. DBMS performance tuning includes global tasks such as managing the DBMS processes in primary memory and managing the structures in physical storage.
    a. True
    b. 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

25. Maximizing disk contention is one of the general recommendations for the physical storage of databases.
    a. True
    b. 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

26. RAID systems use a single disk to create storage volumes.
    a. True
    b. 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

27. On the client side, the objective is to generate an SQL query that returns a correct answer in the least amount of time, using a minimum amount of resources at the server end. The activities required to achieve this goal are commonly referred to as_____tuning.

a. 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

28. On the server side, the database environment must be properly configured to respond to clients' requests in the fastest way possible, while making optimum use of existing resources. The activities required to achieve this goal are commonly referred to as____tuning.

a. 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

29. When moving data from permanent storage to RAM, an I/O disk operation retrieves:

a. 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

30. A DBA determines the initial size of the data files that make up the database; however, as required, the data files can automatically expand in predefined increments known as_____.

a. 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

31. A(n)_____is a logical grouping of several data files that store data with similar characteristics.

a. 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

32. A system table space, a user data table space, an index table space, and a temporary table space are examples of _____.

a. 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

33. 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.

a. 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

34. To work with data, a DBMS must retrieve the data from_____and place them in_____.

a. 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

35. The data cache or_____is a shared, reserved memory area that stores the most recently accessed data blocks in RAM.

a. 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

36. The_____is a shared, reserved memory area that stores the most recently executed SQL statements or PL/SQL procedures, including triggers and functions.

a. 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

37. The_____process analyzes SQL queries and finds the most efficient way to access data.
    a. 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

38. To generate database object statistics manually, following syntax should be used in Oracle:_____.
    a. ANALYZE <TABLE/INDEX> object_name;
    b. CREATE <TABLE/INDEX> object_name;
    c. ANALYZE <TABLE/INDEX> object_name COMPUTE STATISTICS;
    d. 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

39. Automatic query optimization means that the:
    a. optimization takes place at compilation time by the programmer.
    b. DBMS finds the most cost-effective access path without user intervention.
    c. optimization process is scheduled and selected by the end user or programmer.
    d. 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

40. The DBMS_____the SQL query and chooses the most efficient access/execution plan.
    a. 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

41. Which of the following is the first step of query processing at the DBMS server end?
    a. 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

42. The DBMS_____the data and sends the result set back to the client.
    a. 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

43. If there is no index, the DBMS will perform a_____scan.
    a. 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

44. _____refers to the number of different values a column could possibly have.
    a. 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

45. Bitmap indexes tend to use less space than a_____because they use bits instead of bytes to store their data.
    a. 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

46. Knowing the sparsity of a column helps you decide whether the use of_____is appropriate.
    a. 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

47. _____is the central activity during the parsing phase in query processing.
    a. 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

48. When setting optimizer hints,_____instructs the optimizer to minimize the overall execution time, that is, to minimize the time it takes to return the total number of rows in the query result set. This hint is generally used for batch mode processes.
a. 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

49. In standard SQL, the optimizer hint FIRST_ROWS is generally used for_____mode processes.
a. 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

50. In standard SQL, the optimizer hint ALL_ROWS is generally used for_____mode processes.
a. 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

51. The LIKE conditional operator is used by the_____OPERAND1.
a. 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

52. The_____must be set large enough to permit as many data requests to be serviced from cache as possible.
a. 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

53. The majority of primary memory resources will be allocated to the_____cache.
a. 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

54. The_____cache is used as a temporary storage area for ORDER BY or GROUP BY operations, as well as for index-creation functions.
a. 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

55. From the performance point of view,_____databases eliminate disk access bottlenecks.
a. 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

56. The_____table space is used for transaction-recovery purposes.
a. 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

57. In the context of RAID levels,_____refers to writing the same data blocks to separate drives.
a. 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

58. The_____table space is used to store the data dictionary tables.
    a. 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

59. In the context of RAID levels, striped arrays provide:
    a. increased read performance and fault tolerance. b. increased fault tolerance but decreased performance.
    c. increased read performance but no fault tolerance. 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

60. In RAID level 5,:
    a. the data and the parity data are striped across separate drives.
    b. the data blocks are spread over separate drives and are duplicated.
    c. the array requires a minimum of two drives and is known as a striped array.
    d. 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

61. 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

62. 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

63. 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

64. _____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

65. 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

66. 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

67. 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

68. 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

69. _____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

70. 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

71. _____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

72. _____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

73. 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

74. 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

75. _____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

76. 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

77. List and describe some typical DBMS processes.

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

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

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

78. 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, the DBMS must choose what indexes to use, how to perform join operations, which table to use first, and so on. Each DBMS has its own algorithms for determining the most efficient way to access the data. The query 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 the execution plan. For example, a full table scan has a set cost of 10, while a table access by row ID has a set cost of 3.

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

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

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

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80. 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 = 10.00 is processed faster because the DBMS can do a direct search using the index in the column. If there are no exact matches, the condition is evaluated as false. However, if an inequality symbol (>, >=, <, <=) is used, the DBMS must perform additional processing to complete the request, because there will almost always be more "greater than" or "less than" values in the index than "equal" values. With the exception of NULL, the slowest of all comparison operators is LIKE with wildcard symbols, as in V_CONTACT LIKE "%glo%". Also, using the "not equal" symbol (<>) yields slower searches, especially when the sparsity of the data is high—that is, when there are many more different values than there are equal values.

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81. 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 are used.

a) 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 include computations as well while returning the output. Another important note in the first step is that the columns in the SELECT statement should return single values.

b) Identify the source tables:
Once the required columns are identified, the source tables used in the query can be determined. If certain attributes appear in more than one table try to use the least number of tables in the query to minimize the number of join operations.

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

d) Determine what selection criteria is used:
Most queries involve some type of selection criteria. In this case, the operators and operands that are needed by the criteria are determined. The correct data type and the granularity of data in the comparison of criteria need to be ensured.

e) 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 BY clause is particularly used to order the required output in this way but is a very resource-intensive operation for the DBMS.

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KEY: Bloom's Comprehension TOP: Query Formulation

82. 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 access operations. Another advantage of this approach is that different disk block sizes in different volumes can be used. For example, the data volume can use a 16 K block size, while the index volume can use an 8 K block 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 database administrators overlook indexes as a source of contention. By using separate storage volumes and different block sizes, the I/O operations on data and indexes will happen asynchronously; more importantly, the likelihood of write operations blocking read operations is reduced, as page locks tend to lock fewer records.

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