MCA – I

Department of Computer Science
Gujarat University
Theory Assignment – I

-> Transaction management - 1 to 7
-> Deadlock & Concurrency Control - 10 to 22
-> Crash Recovery & Recovery Techniques - 27 to 37

1. Define: Transaction. List and explain ACID properties of transaction.
2. List and explain different transaction state.

   OR

   Discuss the 4 database properties or discuss the properties responsible for the transaction.
3. What is serializability. Explain conflict serializability with example.
4. Discuss the two operations using which transaction access data.[pg 629]
5. Define inconsistent state.[630]
6. Explain view serilizability with example.
7. For a successful completion of transaction, transaction should be in which of the following states?

   OR

   Draw State diagram of a transaction. [14.1][633]
8. Define schedule and serializable schedule. [fg-14.5]
9. Explain Isolation and Atomicity.[646]
10. Define 1. Timestamp 2. Deadklock 3. Latches 4. Convoy
11. Explain 2 phase Locking Protocol (2PL) in detail with example[667]
12. Explain concurency control with example. [fg-646]
13. Define: Concurrency Control. Explain i. Lost update ii. Uncommitted Data iii. Inconsistent Retrieval with example.
14. What is lock granularity? Explain different levels of lock granularity.
15. Explain shared lock and exclusive lock. When two transaction conflict? Explain mutual exclusive rule for shared/exclusive lock.
16. Define: Deadlock. What is deadlock prevention, deadlock detection and dead lock avoidance?
17. Explain wait-die and wound-wait deadlock prevention technique with example.
18. Explain 3 stages of deadlock.
19. Discuss the 2 deadlock prevention scheme.
20. Define: Starvation
21. Explain concurrency control with time stamping methods.
22. What is concurrency control with optimistic method?
23.
24.
25. Define: Database Recovery. List and explain different levels of back up
26. Explain different types of database failures.
27. Explain deferred update and immediate update recovery techniques.
28. Which database recovery technique is not transaction log based for single user environment? Explain the technique with appropriate figure.
29. Write a note on check points.
30. Explain buffer management with example.
31. Explain ARIES recovery algorithm.
32. Write a note on CLR.
33. Write a note on Media Recovery.
34. Write advantages, problems and applications of Optimistic Concurrency Control.
35. Explain Thomas’s Write rule.

36. Explain Forward Recovery (REDO) with appropriate example.
37. Explain Backward Recovery (UNDO) with appropriate example.

MCA – II

Department of Computer Science
Gujarat University
DBMS – II (Theory Assignment – II)

1. List and explain main objective of database security.
2. Compare: Authorisation and Authentication.
3. Define: Access Control. Explain Discretionary Access Control with example.
4. Define: Mandatory Access Control with Bel-Lapadula Model.
5. Write a short note on i. Audit Trail ii. Statistical Database Security
6. Explain Encryption. Compare: Symmetric key encryption and public-key encryption.
7. Define: Parallel Databse.Write advantages and disadvantages of it.
8. Draw and explain various architecture of parallel database. Explain key elements of parallel database processing.
9. Define: Distributed Database with figure. Write the main differences between distributed and parallel database. Explain the desired properties of Distributed databse.
10. Explain i. Homogeneous DDBS ii. Heterogeneous DDBS
11. What is fragmentation. Explain Horizontal fragmentation and Vertical Frgmentation.

Faculty: Dr. Bhumika Shah Subject: RDBMS

MCA – II

Department of Computer Science
Gujarat University
DBMS – II (Theory Assignment – III)

Q – 1 Answer the following questions:

1. Describe three techniques commonly used when developing algorithms for relational operators. Explain how these techniques can be used to design algorithms for the selection, projection, and join operators.
2. What is an access path? When does an index match an access path? What is a primary conjunct, and why is it important?
3. What information is stored in the system catalogs?
4. What are the benefits of storing the system catalogs as relations?
5. What is the goal of query optimization? Why is optimization important?
6. Describe pipelining and its advantages.
7. Give an example query and plan in which pipelining cannot be used.
8. Describe the iterator interface and explain its advantages.
9. Explain concept of Database Performance Tuning. Define: Database Performance Tuning. Explain SQL performance tuning and DBMS performance tuning.
10. Draw and explain DBMS architecture in detail.
11. What do you mean by database statistics? Give syntax and example to manually generate database object statistics.
12. List and explain 3 phases of query processing with appropriate diagram.
13. What do you mean data sparsity? Are you agree with the statement?: Table with very few records has low sparsity. Justify your answer.
14. Compare: Rule Based optimizer and Cost Based optimizer. Write one example for cost based optimization with calculations of I/O costs.
15. Give syntax and example for Rule Based Optimizer and Cost Based Optimizer.

Q - 2

Consider a relation R(a,b,c,d,e) containing 5,000,000 records, where
each data page of the relation holds 10 records. R is organized as a sorted file with secondary indexes. Assume that R.a is a candidate key for R, with values lying in the range 0 to 4,999,999, and that R is stored in R.a order. For each of the following relational algebra queries, state which of the following three approaches is most likely to be the cheapest:

Access the sorted file for R directly.
Use a (clustered) B+ tree index on attribute R.a.
Use a linear hashed index on attribute R.a.
1. $\sigma a<50,000(R)$
2. $\sigma a=50,000(R)$
3. $\sigma a>50,000 \wedge a<50,010(R)$
4. $\sigma a\_=50,000(R)$

Q – 3

Consider again the schema with the Sailors relation:
Sailors(sid: integer, sname: string, rating: integer, age: real)
Assume that each tuple of Sailors is 50 bytes long, that a page can hold 80 Sailors tuples, and that we have 500 pages of such tuples. For each of the following selection conditions, estimate the number of pages retrieved, given the catalog information in the question.

1. Assume that we have a B+-tree index T on the search key _ Sailors.sid , and assume that
IHeight(T) = 4, INPages(T) = 50, Low(T) = 1, and High(T) = 100,000.
(a) σSailors.sid<50,000(Sailors)
(b) σSailors.sid=50,000(Sailors)

2. Assume that we have a hash index T on the search key _ Sailors.sid , and assume that IHeight(T) = 2, INPages(T) = 50, Low(T) = 1,
and High(T) = 100,000.
(a) σSailors.sid<50,000(Sailors) (b) σSailors.sid=50,000(Sailors)