DBMS Unit 5- QB - abcdefghijklmnopqrstuvwxyz

Database Management Systems (SRM Institute of Science and Technology)

SRM INSTITUTE OF SCIENCE AND TECHNOLOGY

Ramapuram Campus, Bharathi Salai, Ramapuram, Chennai - 600089

FACULTY OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

QUESTION BANK

DEGREE / BRANCH: B.Tech CSE

VI SEMESTER

18CSC303J – DATABASE MANAGEMENT SYSTEMS

Regulation – 2018

Academic Year -2021-2022

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SUBJECT : 18CSC303J – DATABASE MANAGEMENT SYSTEMS

SEM/ YEAR : VI/III

Course Outcomes
CO1:
CO2:
CO3:
CO4:
CO5:
CO6: Appreciate the fundamental concepts of transaction processing- concurrency control techniques and recovery procedures

UNIT V

Transaction concepts, properties of transactions, Serializability of transactions, testing for serializability, System recovery, Concurrency Control, Two- Phase Commit protocol, Recovery and Atomicity, Log-based recovery, Concurrent executions of transactions and related problems, Locking mechanism, solution to concurrency related problems, Deadlock, Two-phase locking protocol, Isolation, Intent locking.

PART-A (Multiple Choice Questions)

Q. No	Questions	Course Outcome	Competence BT Level	Page Number
1	What is a collection of operations that form a single logical unit of work is defined as? a) Views b) Networks c) Units d) Transaction **Answer:** d) Transaction	CO6	BT1	625
2	The “all-or-none” property is commonly referred to as _____ a)Isolation b)Durability c)Atomicity d) Consistency **Answer:** c)Atomicity	CO6	BT1	628
3	Which of the following is the property of transaction that protects data from system failure? a) Consistency b)Durability c)Atomicity d)Isolation	CO6	BT2	628

	Answer: b)Durability			
4	Identify the property that the database system must provide to isolate transactions from the effects of other concurrently executing transactions. a)Consistency b)Durability c)Atomicity d) Isolation **Answer:** d) Isolation	CO6	BT2	628
5	Which of the following is a unit of program execution that accesses and possibly updates various data items? a) Schedule b) View c) Transaction d) block **Answer:** c)Transaction	CO6	BT2	628
6	Identify the statements used to delimit a transaction. a) begin transaction and end transaction b) start transaction and stop transaction c) get transaction and post transaction d) read transaction and write transaction **Answer:** a) begin transaction and end transaction	CO6	BT3	629
7	Highlight which property of the database is preserved when execution of a transaction is in isolation. a)Concurrency b)Durability c)Atomicity d) Consistency **Answer:** d) Consistency	CO6	BT1	629
8	What are the ACID properties of Transactions? a)Atomicity,Consistency,Isolation,Datacentric b)Atomicity,Consistency,Isolation,Durability c)Atomicity,Concurrency,Inconsistent,Durability d) Automatically, Concurrency, Isolation, Durability **Answer:** b)Atomicity,Consistency,Isolation,Durability	CO6	BT2	628
9	Choose who has the responsibility of ensuring consistency for an individual transaction. a)Applicationprogrammer b)Databasedesigners c)Naïveusers d) System Analyst **Answer:** a) Application programmer	CO6	BT3	630
10	Determine which state of the system no longer reflects a real state			

	of the world that the database is supposed to capture because of a failure. a) valid state b) inconsistent state c) failed state d) waiting state **Answer:** b)inconsistentstate	CO6	BT3	633
11	Find out to which type of file the transaction information is written as the database system keeps track on disk of the old values of any data. a) block b) record c) log d) backup **Answer:** c)log	CO6	BT1	632
12	Select which component of the database handles atomicity of the database system. a) storage engine b) log manager c) query processor d) recovery system **Answer:** d) recovery system	CO6	BT1	633
13	Choose the component of the database system that ensures the isolation property. a) concurrency-control system b) Optimization engine c) query processor d) recovery system **Answer:** a)concurrency-control system	CO6	BT3	636
14	When a transaction may not always complete its execution successfully it is termed as_____ a) committed b) aborted c) rollback d) active **Answer:** a)aborted	CO6	BT1	634
15	To which state does the transaction move to once the changes caused by an aborted transaction have been undone? a) committed b) aborted c) rollback d) active **Answer:**	CO6	BT2	634

	c)rollback			
16	Which of the following is not a state in transaction? a) Active b) Terminated c) Aborted d) Partially committed **Answer:** b)Terminated	CO6	BT3	634
17	In which of the below states a transaction is said to have terminated? a) active b) Terminated c) either committed or aborted d) Partially committed **Answer:** c)either committed or aborted	CO6	BT2	634
18	Find out the good reason for allowing concurrency? a) Improved throughput and reduced waiting time b) improved response time c) reduce throughput loss d) increase execution time **Answer:** a)Improved throughput and reduced waiting time	CO6	BT1	636
19	When the number of transactions executed increases in a given amount of time, it is defined as_____ a) average response time b) throughput c) disk utilization d) latency **Answer:** b)throughput	CO6	BT1	636
20	Performing concurrent execution of transaction reduces_____ a) waiting time b) buffer time c) queue time d) evaluation time **Answer:** a)waiting time	CO6	BT3	639
21	Serializability of schedules can be ensured through a mechanism called_____ a) evaluation control policy b) concurrency control policy c) execution control policy d) cascading control policy **Answer:** b) concurrency control policy	CO6	BT1	641

22	A schedule can be tested against the conflict serializability by constructing a _____ a) histogram b) gantt chart c) precedence graph d) bar graph **Answer:** c)precedence graph	CO6	BT3	641
23	If a schedule S can be transformed into a schedule S' by a series of swaps of non-conflicting instructions, then S and S' are a) Non conflict equivalent b) Equal c) Conflict equivalent d) Isolation equivalent **Answer:** c)Conflict equivalent	CO6	BT2	641
24	I and J are _____ if they are operations by different transactions on the same data item, and at least one of them is a write operation. a) Conflicting b) Overwriting c) Isolated d) Durable **Answer:** a)Conflicting	CO6	BT2	641
25	Identify the process in which a serializability order of the transactions can be obtained by finding a linear order consistent with the partial order of the precedence graph. a) Selection sorting b) Topological sorting c) Heap sorting d) Insertion sort **Answer:** b) Topological sorting	CO6	BT1	644
26	If a transaction has obtained a _____ lock, it can read but cannot write on the item a) Shared mode b) Exclusive mode c) Read only mode d) Write only mode **Answer:** a) Shared mode	CO6	BT4	644
27	On obtaining which type of lock a transaction can both read and write on the item? a) Shared mode b) Exclusive mode c) Read only mode	CO6	BT1	647

	d) Write only mode **Answer:** b) Exclusive mode			
28	If a transaction can be granted a lock on an item immediately in spite of the presence of another mode, then the two modes are said to be _____ a) Concurrent b) Equivalent c) Compatible d) Executable **Answer:** c) Compatible	CO6	BT1	647
29	Which protocol indicates when a transaction may lock and unlock each of the data items? a) Locking protocol b) Unlocking protocol c) Granting protocol d) Conflict protocol **Answer:** a) Locking protocol	CO6	BT2	651
30	Choose which state a transaction is in if it may obtain locks but may not release any locks. a) Growing phase b) Shrinking phase c) Deadlock phase d) Starved phase **Answer:** a) Growing phase	CO6	BT1	651
31	What is the situation where no transaction can proceed with normal execution? a) Road block b) Deadlock c) Execution halt d) Abortion **Answer:** b) Deadlock	CO6	BT1	665
32	A transaction can proceed only after the concurrency control manager _____ the lock to the transaction a) Grants b) Requests c) Allocates d) deny **Answer:** a) Grants	CO6	BT2	670
33	Choose which phase a transaction is in if it may release locks but may not obtain any locks. a) Growing phase b) Shrinking phase	CO6	BT1	667

	c) Deadlock phase d) Starved phase **Answer:** b)Shrinking phase			
34	If transaction Ti gets an explicit lock on the file Fc in exclusive mode, then it has an _____ on all the records belonging to that file. a) Explicit lock in exclusive mode b) Implicit lock in shared mode c) Explicit lock in shared mode d) Implicit lock in exclusive mode **Answer:** d) Implicit lock in exclusive mode	CO6	BT3	679
35	Who is responsible for assigning, policing and managing the locks used by the transactions? a) Scheduler b) DBMS c) Lock manager d) Locking agent **Answer:** c) Lock manager	CO6	BT1	667
36	Which type of errors causes a transaction to fail? a) logical and system error b) logical and process error c) instance and system error d) media and system error **Answer:** a)logical and system error	CO6	BT1	634
37	The assumption that hardware errors and bugs in the software bring the system to a halt, but do not corrupt the nonvolatile storage contents is referred as _____ a) point based assumption b) fail-stop assumption c) interval based assumption d) fail-abort assumption **Answer:** b)fail-stop assumption	CO6	BT2	722
38	The log is a sequence of _____ recording all the update activities in the database. a) Log records b) Records c) Entries d) Redo **Answer:** Log records	CO6	BT1	632
39	In the _____ scheme, a transaction that wants to update the database first creates a complete copy of the database. a) Shadow copy b) Shadow Paging	CO6	BT2	727

	c) Update log records d) Delete log records **Answer:** a) Shadow copy			
40	The _____ scheme uses a page table containing pointers to all pages; the page table itself and all updated pages are copied to a new location. a) Shadow copy b) Shadow Paging c) Update log records d) Delete log records **Answer:** b) Shadow Paging	CO6	BT1	727
41	If a transaction does not modify the database until it has committed, it is said to use the _____ technique. a) Deferred-modification b) Late-modification c) Immediate-modification d) Undo **Answer:** a) Deferred-modification	CO6	BT1	729
42	If database modifications occur while the transaction is still active, the transaction is said to use the _____technique. a) Deferred-modification b) Late-modification c) Immediate-modification d) Undo **Answer** a) Immediate-modification	CO6	BT2	729
43	_____ using a log record sets the data item specified in the log record to the old value. a) Deferred-modification b) Late-modification c) Immediate-modification d) Undo **Answer:** a)Undo	CO6	BT2	670
44	In the _____ phase, the system replays updates of all transactions by scanning the log forward from the last checkpoint. a) Repeating b) Redo c) Replay d) Undo **Answer:** a)Redo	CO6	BT1	728
45	A special redo-only log record < Ti, Xj, V1> is written to the log, where V1 is the value being restored to data item Xj during the rollback. What are these log records sometimes called as?			

	a) Log records b) Records c) Compensation log records d) Compensation redo records **Answer:** c)Compensation log records	CO6	BT1	736
46	When the actions are played in the order while recording it is called _____ history. a) Repeating b) Redo c) Replay d) Undo **Answer:** a) Repeating	CO6	BT3	737
47	The deadlock state can be changed back to stable state by using which of the following statement? a) Commit b) Rollback c) Savepoint d) Deadlock **Answer:** a)Rollback	CO6	BT1	648
48	When transaction Ti requests a data item currently held by Tj, Ti is allowed to wait only if it has a timestamp smaller than that of Tj (that is, Ti is older than Tj). Otherwise, Ti is rolled back (dies). this is defined as_____ a) Wait-die b) Wait-wound c) Wound-wait d) Wait **Answer:** a)Wait-die	CO6	BT2	675
49	When transaction Ti requests a data item currently held by Tj, Ti is allowed to wait only if it has a timestamp larger than that of Tj (that is, Ti is younger than Tj). Otherwise, Tj is rolled back (Tj is wounded by Ti), this is termed as_____ a) Wait-die b) Wait-wound c) Wound-wait d) Wait **Answer:** a)Wound-wait	CO6	BT2	675
50	The situation where the lock waits only for a specified amount of time for another lock to be released is referred as_____ a) Lock timeout b) Wait-wound c) Timeout d) Wait	CO6	BT1	676

	Answer: a)Lock timeout			
	PART B (4 Marks)			
1	**List the ACID properties. Explain the usefulness of each.** The database transaction system maintains the following four properties. These properties are often called the ACID properties; the acronym is derived from the first letter of each of the four properties. ● Atomicity ● Consistency ● Isolation ● Durability **Atomicity:** Either all operations of the transaction are reflected properly in the database, or none should be updated. **Consistency:** Execution of a transaction in isolation preserves the consistency of the database. **Isolation:** Even though multiple transactions may execute concurrently, the system guarantees that, for every pair of transactions *Ti* and *Tj* , it appears to *Ti* that either *Tj* finished execution before *Ti* started or *Tj* started execution after *Ti* finished. Thus, each transaction is unaware of other transactions executing concurrently in the system. **Durability:** After a transaction completes successfully, the changes it has made to the database persist, even if there are system failures.	CO6	BT2	628
2	**Explain the distinction between the term's serial schedule and serializable schedule.** T_1: read(A); A := A − 50; write(A); read(B); B := B + 50; write(B); commit T_2: read(A); temp := A * 0.1; A := A − temp; write(A); read(B); B := B + temp; write(B); commit	CO6	BT1	636

	Fig 3.2. Schedule 1 - A serial schedule in which T_1 is followed by T_2 If the transactions are executed one at a time in the order T_2 followed by T_1, then the corresponding execution sequence is that of *fig 3.3*. Again, as expected, the sum $A + B$ is preserved, and the final values of accounts A and B are Rs. 850 and Rs. 2150, respectively. **T_1** | **T_2** *read(A)* *temp := A * 0.1* *A := A − temp* *write(A)* *read(B)* *B := B + temp* *write(B)* *commit* *read(A)* *A := A − 50* *write(A)* *read(B)* *B := B + 50* *write(B)* *commit* *Fig 3.3. Schedule 2 - A serial schedule in which T_2 is followed by T_1* The execution sequences which represent the chronological order, in which instructions are executed in the system, are called **schedules**. Schedule 1 and schedule 2 are serial schedules. Several execution sequences are possible, since the various instructions from both transactions may now be interleaved. Given two transactions are executed concurrently.			
3	**What benefit does rigorous two-phase locking provide?** ● In strict two phase locking protocol all exclusive mode locks taken by a transaction is held until that transaction commits. ● Rigorous two phase locking protocol requires that all locks be held until the transaction commits.	CO6	BT1	651
4	**If deadlock is avoided by deadlock-avoidance schemes, is starvation still possible? Explain your answer.** There are two approaches for deadlock prevention:	CO6	BT1	665

	One approach ensures that no cyclic waits can occur by ordering the request for locks, or requiring all locks to be acquired together. This approach required that each transaction locks all data items before it begins execution. It is required that, either all data items should be locked in one step, or none should be locked. In a system where the selection of victims is based primarily on cost factors, it may happen that the same transaction is always picked as a victim. As a result, this transaction never completes its designated task, thus there is starvation. We must ensure that a transaction can be picked as a victim only a finite number of times. The most common solution is to include the number of rollbacks in the cost factor.			
5	**Explain the purpose of the checkpoint mechanism. How often should checkpoints be performed?** When a system crash occurs, we must consult the log to determine those transactions that need to be redone and those that need to be undone. In principle, we need to search the entire log to determine this information. There are two major difficulties with this approach: ● The search process is time-consuming. ● Most of the transactions that, according to our algorithm, need to be redone have already written their updates into the database. Although redoing them will cause no harm, it will nevertheless cause recovery to take longer.	CO6	BT2	734
6	**What is locking and explain two phase locking protocol.** ● A transaction T must either commit at all sites, or it must abort at all sites. To ensure this property, the transaction coordinator of T must execute a commit *protocol*. **Two-Phase Commit** ● Consider a transaction T initiated at site S_i, where the transaction coordinator is C_i. ● When T completes its execution—that is, when all the sites at which T has executed inform C_i that T has completed C_i starts the 2PC protocol.	CO6	BT1	667
7	**Define a transaction. Then discuss the following with relevant examples: (i) read only transaction (ii) A read write transaction**. The order in which updates are carried out by redo is important; when recovering from a system crash, if updates to a particular data item are applied in an order different from the order in which they were applied originally, the final state of that data item will have a wrong value. Most recovery algorithms do not perform redo of each transaction separately; instead they perform a single scan of the log, during which redo actions are performed for each log record as it is encountered. This approach ensures the order of updates is preserved, and is more efficient	CO6	BT1	732

	since the log needs to be read only once overall, instead of once per transaction.			
8	**When do you say that the system is in deadlock? Explain.** A system is in a deadlock state if there exists a set of transactions such that every transaction in the set is waiting for another transaction in the set. More precisely, there exists a set of waiting transactions {T0, T1, . . . , Tn} such that T0 is waiting for a data item that T1 holds, and T1 is waiting for a data item that T2 holds, and . . . , and Tn−1 is waiting for a data item that Tn holds, and Tn is waiting for a data item that T0 holds. None of the transactions can make progress in such a situation.	CO6	BT3	665
	PART C (12 Marks)			
1	Show that the two-phase locking protocol ensures conflict serializability, and that transactions can be serialized according to their lock points.	CO6	BT5	667
2	Under what conditions is it less expensive to avoid deadlock than to allow deadlocks to occur and then to detect them?	CO6	BT4	674
3	Explain testing for Serializability with respect to concurrency control schemes. How will you determine whether a schedule is serializable or not.	CO6	BT1	681
4	What is concurrency Control? How is it implemented in DBMS?	CO6	BT2	651
5	Explain the properties of transactions. Illustrate the states of transactions.	CO6	BT6	627

Note:

1. **BT Level –** Blooms Taxonomy Level
2. **CO – Course Outcomes**

BT1 – Remember BT2 – Understand BT3 – Apply BT4 – Analyze BT5 – Evaluate BT6 – Create