GATE

Computer Science & Information Technology

Database Management System

DPP: 2

Transaction and Concurrency Control

Q1 A locking protocol is implemented as follows. Before a transaction T writes a data item A, T need to acquire exclusive lock on A, and if transaction T wants to read a data item A, T needs to acquire a shared lock on A. If exclusive locks can be unlocked only after the commit operation of the transaction, and shared locks can be released at any time, which of the following properties is/are guaranteed by the protocol?
(A) Conflict serializability
(B) Recoverability
(C) Cascade less schedule
(D) No lost update problem

Q2 A locking protocol is implemented as follows. Before a transaction T writes a data item A, T need to acquire exclusive lock on A, and if transaction T wants to read a data item A, T needs to acquire a shared lock on A. If both exclusive as well as shared locks can be unlocked only after the commit operation of the transaction, which of the following properties is/ are guaranteed by the protocol?
(A) Conflict serializability
(B) Recoverability
(C) Cascade less schedule
(D) No lost update problem

Q3 Which of the following schedule is allowed by Basic 2PL?
(A) $R_1(A), W_2(A), W_1(A), R_3(A)$
(B) $W_1(A), R_2(B), R_1(B), R_2(A)$
(C) $R_1(A), R_2(A), W_1(A), W_2(A)$
(D) $R_1(A), R_2(B), R_3(C), W_1(B), W_2(C), W_3(C)$

Q4 Which of the following properties is/are guaranteed by Basic 2PL?
(A) Conflict serializability
(B) Recoverability
(C) Cascade less roll back
(D) Deadlock avoidance

Q5 Which of the following properties is/are guaranteed by Strict 2PL?
(A) Conflict serializability
(B) Recoverability
(C) Cascade less Roll back
(D) Deadlock avoidance

Q6 Which of the following properties is/are guaranteed by Conservative 2PL?
(A) Conflict serializability
(B) Recoverability
(C) Cascade less Roll back
(D) Deadlock avoidance

Q7 Which of the following statements is/are true ?
(A) Every schedule allowed by Basic 2PL is a conflict serializable schedule.
(B) Every conflict serializable schedule is allowed by Basic 2PL.
(C) Every schedule allowed by Basic 2PL is also allowed by strict 2PL..
(D) Every schedule allowed by Strict - 2PL is also allowed by Basic 2PL..

Q8 Consider three transactions T_1, T_2 & T_3 with time stamps(TS) such that $TS(T_1) < TS(T_2) < TS(T_3)$. Which of the following schedule is allowed to execute using Basic Time Stamp ordering protocol?
(A) $R_3(A), R_2(A), W_3(A), R_1(A), W_1(A), W_2(B)$
(B) $R_1(A), R_3(A), W_3(A), W_1(A), R_2(A), W_2(B)$
(C) $R_1(A), R_3(A), R_2(A), W_1(B), W_3(A), W_2(B)$
(D) $R_1(A), R_2(A), W_3(B), W_1(A), R_1(B), W_2(A)$

Q9 Which of the following statements is/are true ?
(A) Every schedule allowed by Basic Time stamp

GATE

ordering protocol is a conflict serializable schedule.

(B) Every conflict serializable schedule is allowed by Basic time stamp ordering protocol for some time stamp ordering of transactions.

(C) Every schedule allowed by Basic time stamp ordering protocol is also allowed by Time stamp ordering protocol with Thomas write rule for some time stamp ordering of transactions.

(D) If schedule is a view serializable schedule and view equivalent serial schedule is based on time stamp ordering of transactions, then schedule is allowed to execute using Time stamp ordering protocol with Thomas write rule without any roll back.

Q10 Consider the following schedule S

S: R_2 (B), W_1(C) , W_3 (B), R_3 (C), W_2(B), W_1 (A); for which of the following time stamp orderings transactions of the schedule will execute without roll back using time stamp ordering protocol with Thomas write rule.

(A) TS(T_1, T_2, T_3) = (10, 20, 30)

(B) TS(T_1, T_2, T_3) = (20, 10, 30)

(C) TS(T_1, T_2, T_3) = (10, 30, 20)

(D) TS(T_1, T_2, T_3) = (20, 30, 10)

Q11 Suppose transaction T1 is already running and a new transaction T2 starts up and begins contending with T1 for resources.

Which of the following is/are true?

(A) Using wait-die protocol, if T_1 requires the resources held by T_2, then T_1 roll back

(B) Using wait-die protocol, if T_2 requires the resources held by T_1, then T_2 roll back

(C) Using wound-wait protocol, if T1 requires the resource held by T2, then T1 roll back

(D) Using wound-wait protocol, If T_2 requires the resource held by T_1, then T_2 roll back

GATE

Answer Key

Q1 (B, C, D)

Q2 (A, B, C, D)

Q3 (B)

Q4 (A)

Q5 (A, B, C)

Q6 (A, D)

Q7 (A, D)

Q8 (C)

Q9 (A, B, C, D)

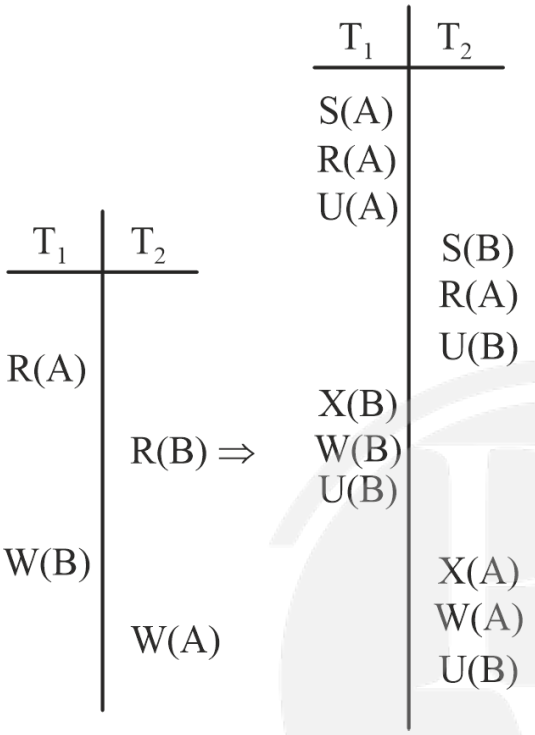
Q10 (A, B)

Q11 (B)

GATE

Hints & Solutions

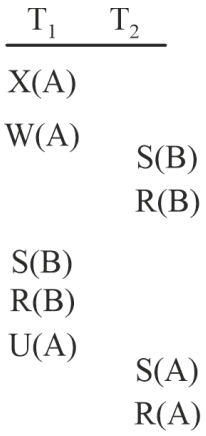
Q1 Text Solution:



Q2 Text Solution:

All properties are guranteed by the protocol.

Q3 Text Solution:



Q4 Text Solution:

If a schedule is allowed to execute using Basic 2PL, then schedule is conflict serializable schedule.

Q5 Text Solution:

Basic 2PL + Strict recoverarbility condition = Strict 2PL

Q6 Text Solution:

Conservative 2PL

- Used to avoid deadlock. It dissatisfies hold and wait using "hold or wait" strategy.
- Transaction will request for all the locks required for its execution before starting the execution.
- It only defines the order in which locks will be acquired {that is, before starting the execution of transaction}. It does not define the order in which locks will be released (that is, exclusive locks may be released before the commit operation of transaction}, and hence irrecoverability and cascading rollback problems are still possible with conservative 2PL.

Q7 Text Solution:

Option A and D are correct.

Q8 Text Solution:

(A) Fails due to $W_3(A) \rightarrow R_1(A)$

(B) Fails due to $W_3(A) \rightarrow W_1(A)$

(D) Fails due to $R_2(A) \rightarrow W_1(A)$

Q9 Text Solution:

All options are correct.

Q10 Text Solution:

Option A and B are correct.

Q11 Text Solution:

Option B is correct.