

Q1. A transaction writes to a page with PageLSN = 500. The log contains the following LSNs: 480, 490, 510, 520.

Which log entries will be redone if a crash occurs?

Q2. Consider a transaction T1 that made the following updates:

- LSN 100 → Page A
- LSN 120 → Page B
- LSN 140 → Page C

If T1 crashes before committing, what will be the sequence of undo operations?

Q3. If a system takes a checkpoint every 100 transactions and a crash occurs after 550 transactions, how many transactions need to be analyzed during recovery?

Q4. A system logs the following dirty pages at a checkpoint:

- Page A (first modified at LSN 300)
- Page B (first modified at LSN 350)

If a crash occurs at LSN 450, from which LSN should the redo phase start?

Q5. Each log record in ARIES takes 32 bytes. If a transaction generates 500 log records, how much space will it consume?

Q6. A transaction T2 performs the following operations:

1. Writes Page X at LSN 600.
2. Writes Page Y at LSN 650.
3. Encounters an error and rolls back to LSN 600.

How is this handled in ARIES?

Q7. A data page has PageLSN = 1000. The log contains:

- LSN 950 (Update to Page A)
- LSN 1050 (Update to Page A)
- LSN 1100 (Update to Page B)

Which entries will be redone?

Q8. A system follows Write-Ahead Logging (WAL). If a transaction commits at LSN 700, what is the latest LSN that must be written to disk before committing?

Q9. A parent transaction T3 spawns a nested transaction T4. The following LSNs are logged:

- T3 starts (LSN 300)
- T4 starts (LSN 320)
- T4 writes Page P (LSN 350)
- T4 commits (LSN 400)
- T3 crashes before committing

What happens during recovery?

Q10. Consider two transactions, T5 and T6, with the following logs:

- T5 updates Page Q (LSN 800)
- T6 updates Page R (LSN 850)
- T5 commits (LSN 900)
- T6 crashes before committing

What will happen during the redo phase?