

Q.

what is deadlock.

⇒ - is a situation in computer science where two or more processes are unable to proceed because each is waiting for the other to release a resource or terminate.

• Recovery techniques:

① Detection and Resolution:

- Identify deadlocks and resolve them by killing processes or rolling back transactions.

② Resource preemption: forcefully take resources from one process to give to others to break the deadlock.

③ Timeouts: if a process can't get a resource within a time limit, release its resources & restart.

④ Avoidance Algorithms:

- use algorithms to allocate resources safely, preventing deadlocks from happening in the first place.

Q. If we are to ensure atomicity, all the sites in which transaction T executed must agree on the final outcome of the execution T. must either commit at all sites or it must abort at all sites.
describe the two phase commit protocol used to ensure this property in detail.

- ⇒
- Two-phase commit (2PC) protocol ensures that all sites in a distributed transaction agree on whether to commit or abort.
 - It involves two phases: Voting & committing.
 - In voting phase, the coordinator asks participants if they're ready to commit.
 - In committing phase, if all agree, the coordinator tells everyone to commit; otherwise, it aborts.
 - This ensures atomicity but can be slow & prone to blocking if any component fails.

Q. How does the granularity of data items affect the performance of concurrency control?
what factors affect the selection of granularity size of data items.

- ⇒
- granularity of data items impacts concurrency control in databases.
 - Finer granularity allows more concurrent transactions but incurs higher overhead.
 - Coarser granularity simplifies lock management but may increase contention.
 - factors affecting granularity selection include concurrency requirements, access patterns,

System overhead, deadlock avoidance & data integrity needs.

- Balancing these factors optimizes concurrency control performance while ensuring data consistency.

Q. Explain deadlock prevention and recovery.

⇒ • Deadlock prevention :

- It aims to ensure deadlock conditions never occur by controlling resource allocation.
- Techniques include resource ordering & allocation strategies like the banker's algorithm.

• Deadlock recovery :

- It deals with detecting & resolving existing deadlocks through techniques like process termination or resource preemption.

Q. Difference betⁿ conflict serializable schedule & view serializable schedule.

⇒ • Conflict serializability :

- It ensures that the order of conflicting operations in concurrent transactions can be rearranged to make it equivalent to a serial execution without conflicts.
- If a schedule is view serializable then it may or may not be conflict serializable.
- View serializability considers the final database state.
- Conflict serializability focuses on conflicting operations.

(ii) view serializability

- It ensures that the final state of the database is the same as some serial execution of the transactions.

- If a schedule is conflict serializable then it is also view serializable schedule.

- View serializability considers the final database state.