DBMS

Assignment

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Explain about RAID storage and its types.

Ans RAID Storage

Defination:-

RAID (Reduandant Array of Independent Disks) is a data storage technology that combines multiple physical hard drives into a Single logical unit to improve performance, data reliability, and fault tolerance.

Types of RAID:-

1. RAID 0 - striping

Data is split across multiple disks

Advantages: High performance, fast read

Disadvantages: No fault tolerance

2. RAID 1 - Mirroring

• Data is duplicated (mirrored) on two or more disk.

• Advantages: High reliability; if one disk fails, data is Safe

• Disadvantages: Expensive

3. RAID 5 - Block-level striping with Parity

• Data and parity are distributed across all disks.

Advantages:

Good performance and fault tolerance

Disadvantages:

Slower write performance due to Parity calculation.

4 • RAID 6 - Double Parity

· Similar to RAID 5 but with two parity blocks

Advantages: Can survive the failure of two disks.

Disadvantages: More complex and slower writes

5 · RAID 10 - Mirroring + striping

· Combines RAID 1 and RAID 0

· Advantages: High speed and high reliability.

· Disadvantages: Requires at leat 4 disks and is costly.

Conclusion:

RAID improves performance, reliability, and data protection by combining multiple disks intelligently.

Explain about Deadlock and its handling?

Ans: Deadlock:

Definition:

A Deadlock is a situation is an Operating System where two or more processes are waiting for resources held by each other, and none of them can proceed.

Conditions for Deadlock

A deadlock occur if all four of these conditions hold simultaneously:

1. Mutual exclusion:

At least one resource must be held in a non-shareable mode.

2. Hold and wait:

A process holding a resource is waiting for another resource.

3. No preemption:

Resources cannot be forcibly taken from a Process.

4. Circular wait:

A Circular chain of processes exits, where each is waiting for a resource held by the next process.

Deadlock Handling Methods:-

1. Deadlock Prevention:-

- Ensures that at least one of the four deadlock conditions never holds.

ex:- Don't allow "hold and wait" → process must request all resources at once.

2. Deadlock Avoidance:

→ Uses algorithms to decide whether to grant a resource request.

→ The system checks if the state will remain safe before allocating resources.

3. Deadlock Detection and Recovery:

- The system allows deadlocks to occur but detects it later using detection algorithms.
- Then recovers by:
  - Terminating one or more processes
  - Preempting resources.

4. Deadlock Ignorance:-

- The system ignores the problem completely.

- Assumes deadlocks are rare and can be manually resolved by the user.

Normalization and its various types of
Normalization.

Ans:- Normalization:-

Defination:

     Normalization is a process in Database
Management System used to organize data
efficiently by removing redundancy and ensuring
data integrity.

     It divides large tables into smaller, related
tables and defines relationships between them to
reduce anomalies.

Objectives of Normalization:-

1. To eliminate data redundancy.
2. To ensure data consistency.
3. To Simplify data structure and maintenance
4. To improve query performance.

Types of Normalization:-

1. first Normal form (1NF):

A table is in 1NF if:

Each cell contains only atomic values
Each record is unique.

Examples-

If a column has multiple phone numbers, seperate them into different rows or a new table.

2. Second Normal form (2NF):
→ It is already in 1NF
→ All non-key attributes are fully functionally dependent on the primary key

Example:-

Remove columns that depend on part of a composite key and place them in a separate table

3. Third Normal form (3NF):-
→ It is already in 2NF
→ There is no transitive dependency

Example:-

If student → Department and Department → HOD, remove HOD from student table and create a seperate table for Department.

4. Boyce-Codd Normal form (BCNF):-
→ A stronger version of 3NF
→ A table is in BCNF if:
  • for every functional dependency $(x \rightarrow v)$, x is a Super key.

Used to handle anomalies not covered by 3NF.

5. Fourth Normal form (4NF):

- A table is 4NF if:
- it is in BCNF.
- It has no multi-valued dependencies.

6. Fifth Normal form (5NF):

- A table is in 5NF if:
  - It is in 4NF
  - It removes join dependencies that are not implied by candidate keys.