

# DBMS

## Assignment

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## Unit-III

Normalization and its various types of Normalization.

Normalization:

Definition:

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

Types of Normalization:

1. First Normal form (1NF):

A table is in 1NF if:

Each cell contains only atomic values

Each record is unique.

Example:-

If a column has multiple phone numbers, separate 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.



### 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 separate table for Department

### 4. Boyce - Codd Normal form (BCNF):-

→ A stronger version of 3NF

→ A table is in BCNF if:

- for every functional dependency  $(X \rightarrow Y)$ ,  $X$  is ~~used~~ 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

## Unit-IV

Any- Explain about Deadlock and its handling?

Dead lock:-

Defination:

A Deadlock is a situation in 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 occurs 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 process exists, 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 process.
- Preempting resources.

### 4. Deadlock Ignorance:

→ The system ignores the problem completely.

## Unit-II

Explain about RAID Storage and its types.

RAID Storage.

Definition:-

RAID (Redundant Array of Independent Disks) is a data storage technology that combines multiple physical hard devices 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 on two or more disks.

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 and disk



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 least 4 disks and is costly.