Operating Systems & Database Concepts – Flashcards

Concept: Processes vs Threads

Definition: Process: independent execution unit. Thread: lightweight process sharing memory.

Example: Multiple threads in a Chrome tab

Concept: Context Switching

Definition: CPU switches from one process/thread to another, saving state.

Example: Occurs in multitasking OS

Concept: Paging

Definition: Dividing memory into fixed-size pages for efficient memory use.

Example: Avoids external fragmentation

Concept: Deadlock

Definition: Two or more processes waiting on each other indefinitely.

Example: Banker's Algorithm can prevent it

Concept: Synchronization

Definition: Ensures proper sequence when threads access shared resources.

Example: Mutex, Semaphore

Concept: Multithreading

Definition: Running multiple threads in a process for parallelism.

Example: Used in Java servers

Concept: Memory Management

Definition: Tracks memory usage and allocates/deallocates dynamically.

Example: Handled by OS with paging and segmentation

Concept: Normalization

Definition: Organizing DB to reduce redundancy.

Example: 3NF ensures no transitive dependency

Concept: ACID

Definition: Atomicity, Consistency, Isolation, Durability – properties of transactions.

Example: Ensures DB reliability

Concept: Indexing

Definition: Improves query speed using data structures.

Example: B-tree index on user_id

Concept: Joins

Definition: Combines data from multiple tables.

Example: INNER JOIN for matching rows

Concept: SQL vs NoSQL

Definition: SQL: structured data, NoSQL: flexible schemas.

Example: MySQL vs MongoDB

Concept: CAP Theorem

Definition: In distributed DB: can't have Consistency, Availability & Partition Tolerance all at once.

Example: Choose 2 out of 3

Concept: Sharding

Definition: Splitting data across multiple DBs.

Example: Used in large-scale NoSQL DBs like MongoDB

Concept: Replication

Definition: Copies of same data in multiple servers for availability.

Example: MySQL master-slave setup