

Database Fundamentals

Mo D Jabeen

September 3, 2022

1 Evolution of database design

1.1 What has triggered the evolution in database?

- Business need to be agile, hypothesis/business models need to be tested fast and then decisions made if a pivot is required. Market insights should allow for quick changes to products/operations.
- CPU improvement is decelerating, and parallelism is increasing

1.2 What is data intensive application?

A data intensive application primary challenge is the use of data (storage, transformation, transmission etc) this is primary bottle neck whereas in compute intensive apps CPU cycles is the bottle neck.

2 Fundamental metrics

Reliability: Tolerate hardware, software and human faults.

Scalability: Maintain load and performance as quantities increase.

Maintainability: Operability, simplicity and evolvability. (Ease of understanding).

3 Database Systems

3.1 What are some elements of a database system?

- Cache - Results of expensive operations
- Stream processing - Asynchronous processes messaging
- Batch processing - Crunch a large amount of accumulated data
- Message queue - Hold data for use with other processes

3.2 Which tool should you use?

No single tools fits all applications, instead the work should be broken into tasks and then the most appropriate/effective tool used.

Example: Caching - Memcached

4 Internal vs External

4.1 In code data structures

Data structures in code should be structured and used differently to external databases. In code data ie for OOP should be based around their use in logic. Databases can be used by multiple separate processes whereas data structs should only be used by local code.

Data structs should:

- Be limited in size
- Not generally used for concurrent programs
- Not tied to ACID (Atomic,consistent,isolated and durable)
- Fast

5 Understanding Text

5.0.1 *subsubsection*