Storage Hierarchy

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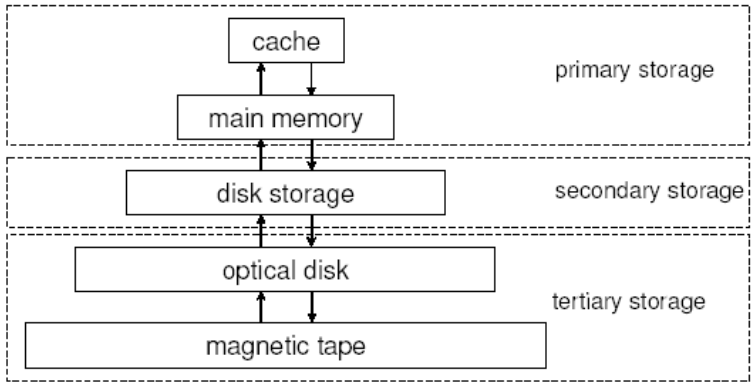
Primary, secondary and tertiary storage



Primary Storage

Primary Storage consists of main memory and processor cache

Very fast, for modern main memory:

- sequential read: 50 GByte/s
- latency: 100ns

Data can be directly processed by CPU

Access to data with fine granularity: each byte can be addressed

Number of accessible bytes depends on address scheme: 32-bit address scheme implies that only 2^{32} bytes are addressable

Volatile, non-reliable storage media

Secondary Storage

hard disk storage or SSD

stable, non-volatile, reliable

much larger, e.g. 10 TByte per medium

By orders of magnitude cheaper

Data can not be directly processed

Access granularity is coarse: blocks of e.g., 4 KBytes

Much slower, even for modern drives:

- for HDD: sequential read: up to 280 MByte/s, latency: 1-30 ms
- for SSD: sequential read: up to 7000 MByte/s, latency: 10-100 µs

Necessary:

- good buffer management (high hit ratio)
- good query management