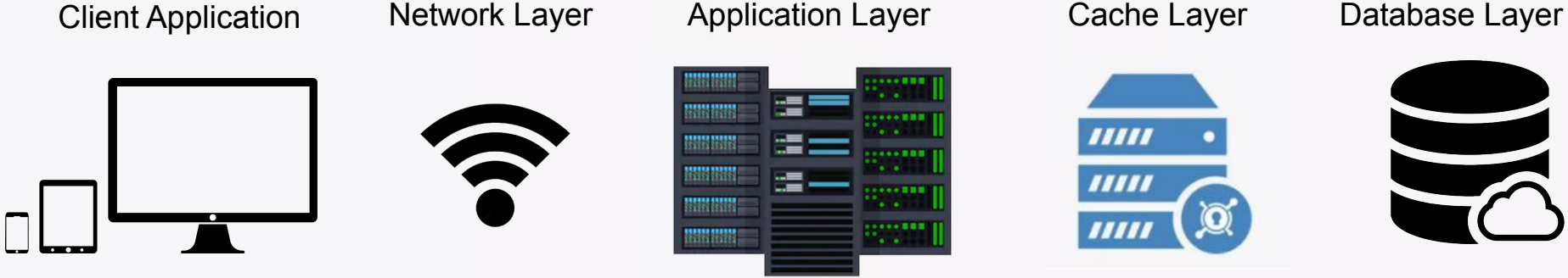
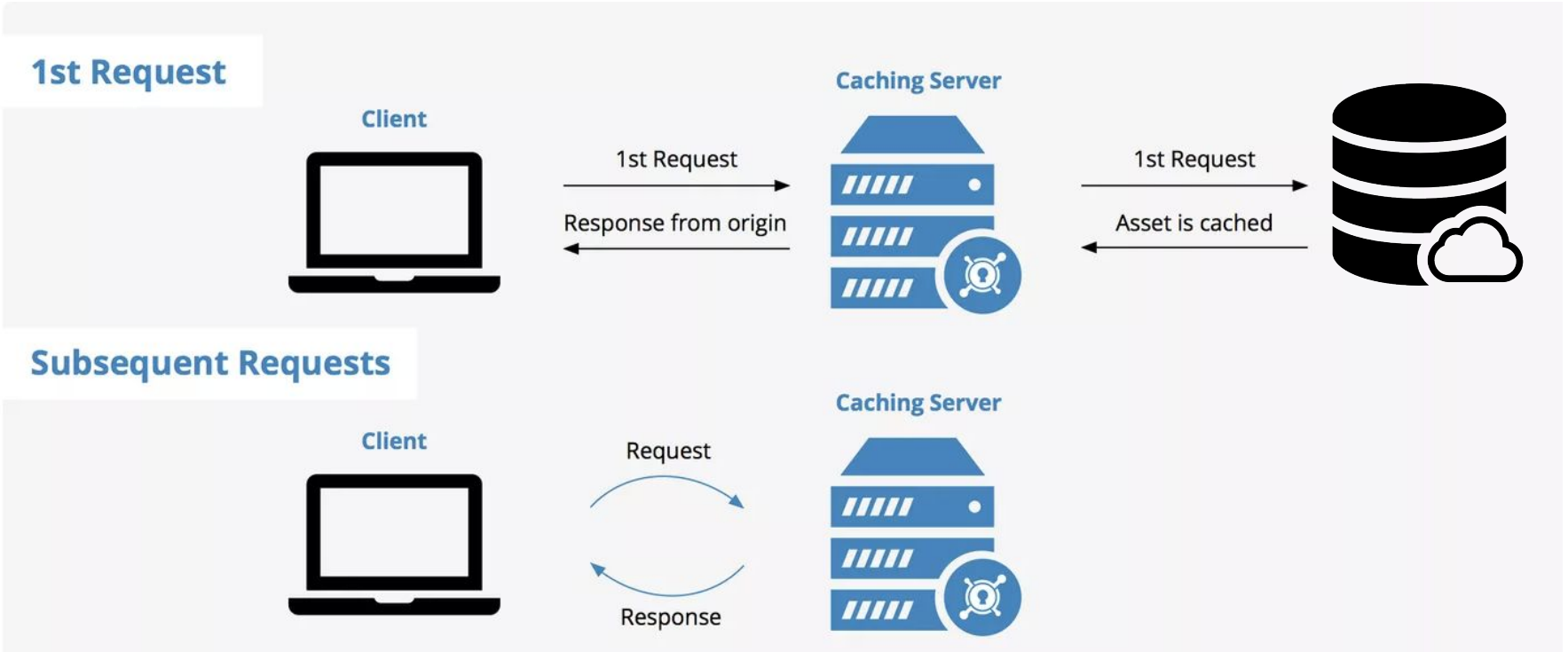
System Design Fundamentals

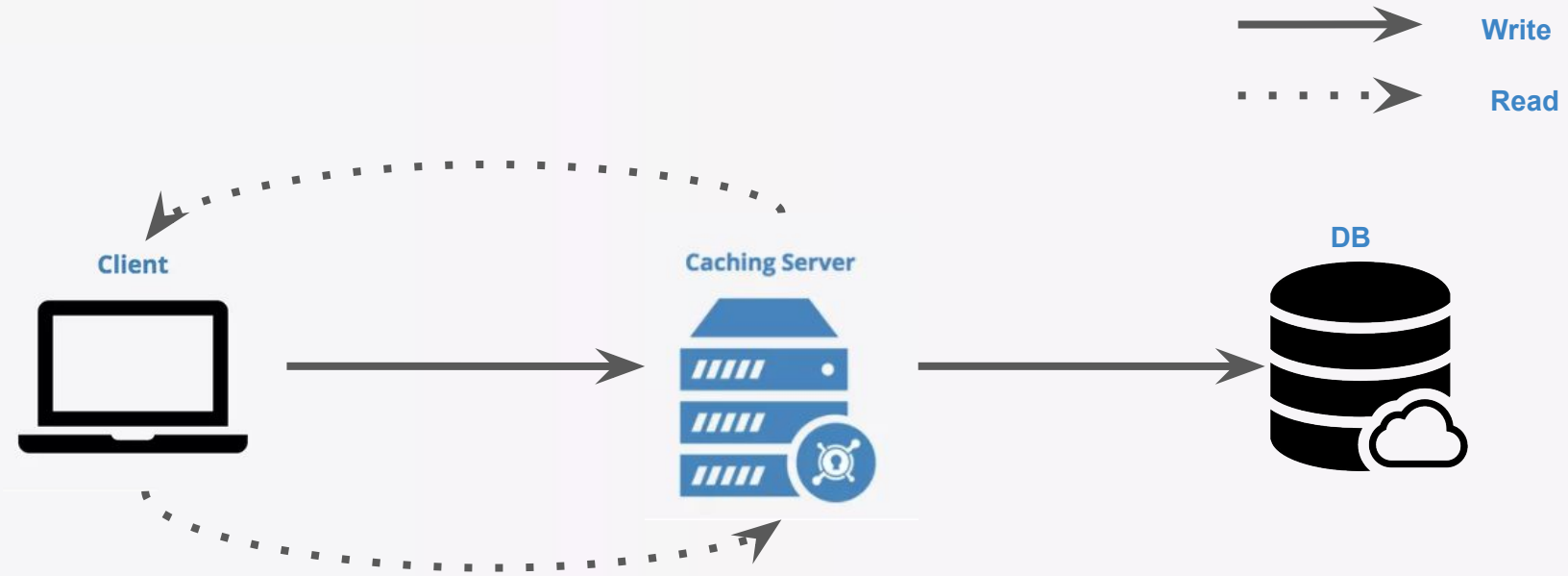
Caching



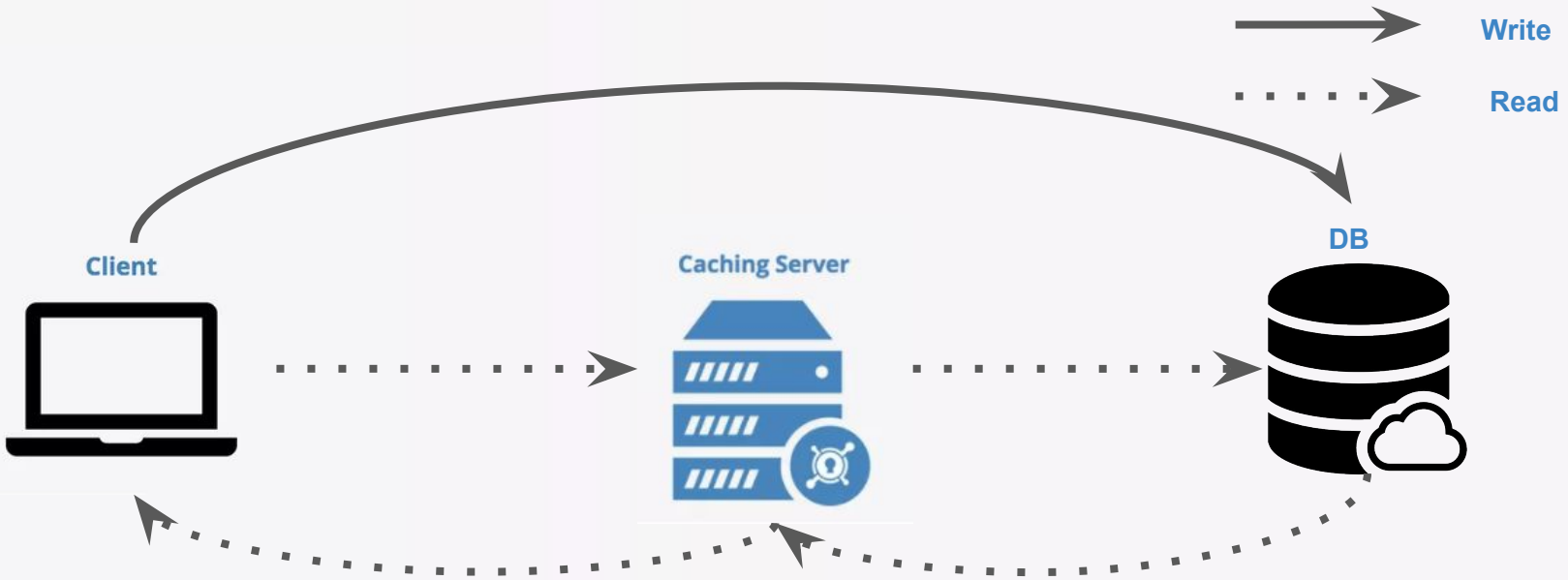
Why Cache?


1st Request
Client
1st Request
Response from origin
Caching Server
1st Request
Asset is cached
Subsequent Requests
Client
Request
Response
Caching Server

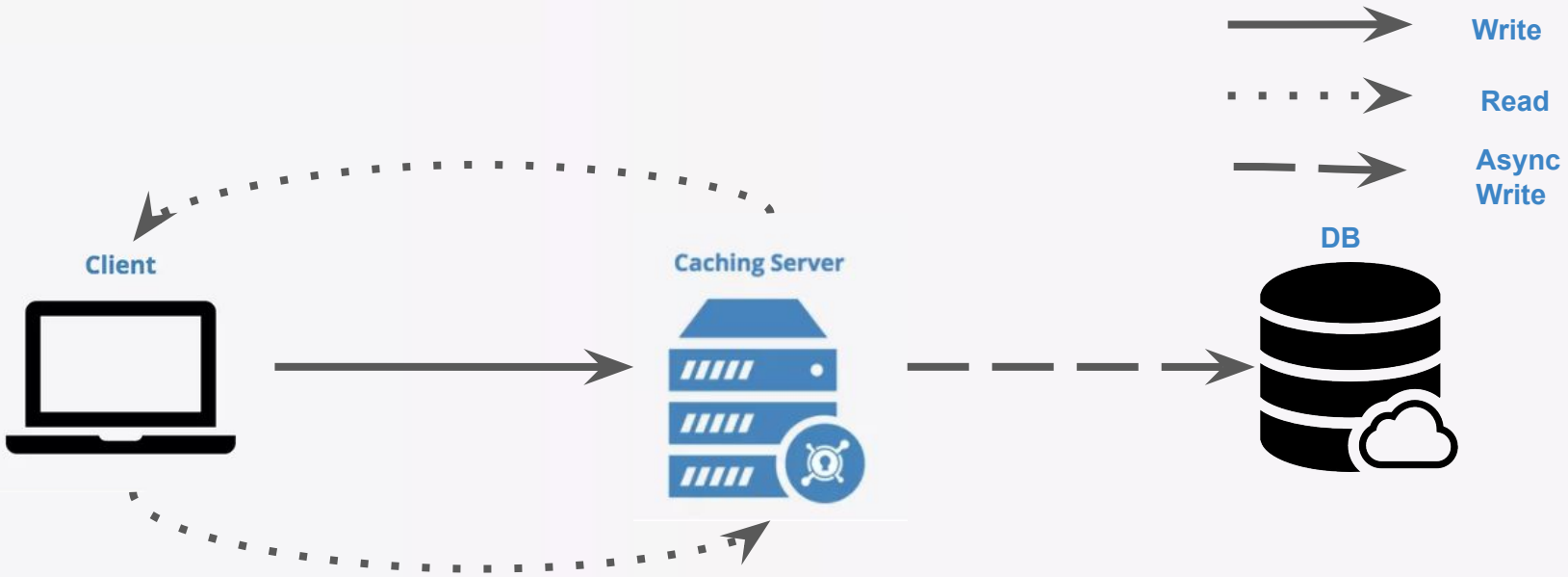
Types of Caches - Write through cache



Types of Caches - Write around cache



Types of Caches - Write back cache



Heartbeat Mechanism

$f = 2\ Hz$

Hashing correlated data

- **Offline Updates:**

  Keep hashmap maintaining query to its frequency and update when frequency cross a threshold.

- **Sampling:**

  sample 1 in n query and update data using that estimate.

Content Delivery Network (CDN)

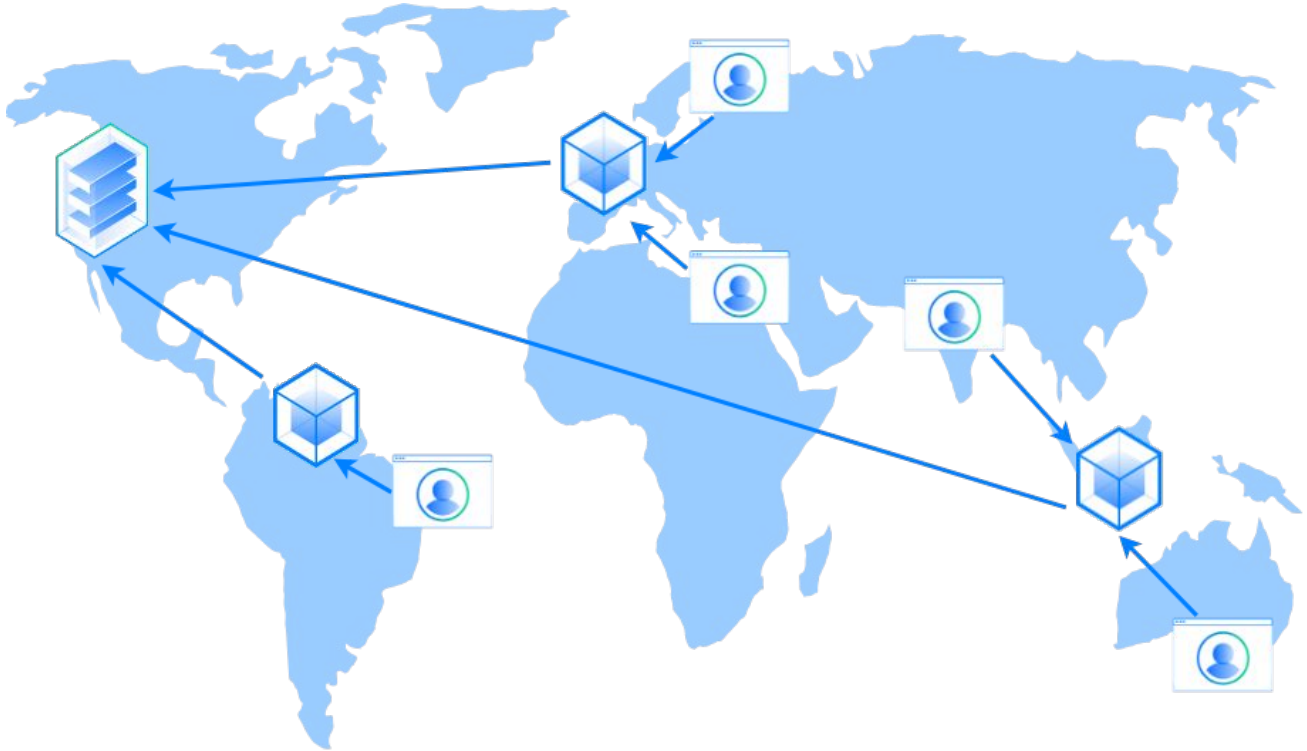


Image credit: Ashely John

Cache performance parameters

- Read/write speed.
- Memory usage.
- Disk I/O dumping.
- Scaling.

State of the art

Redis 

- Wide use cases
- Advanced data structures
- Snapshots
- Replication
- Transactions
- Pub/Sub
- Lua scripting
- Geospatial support

Memcached 

- Simplicity
- Higher memory utilization
- Multi-threaded

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