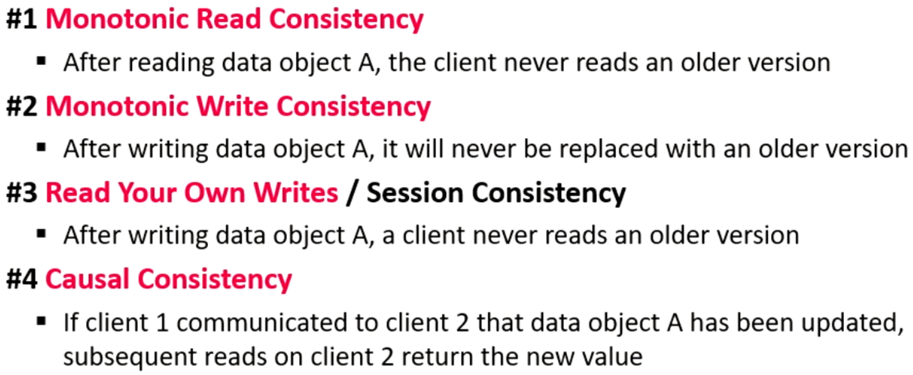
BASE Properties

- instead of ACID in [[NoSQL]] systems
- basically available
  - focus on availability
  - potentially outdated dta
  - no guarantee on consistent data
- soft state
  - data might change later on
  - due to async updates/nodes becoming available again
- eventual consistency
  - after enough time data distributed on all nodes become consistent



#1 Monotonic Read Consistency

- After reading data object A, the client never reads an older version

#2 Monotonic Write Consistency

- After writing data object A, it will never be replaced with an older version

#3 Read Your Own Writes / Session Consistency

- After writing data object A, a client never reads an older version

#4 Causal Consistency

- If client 1 communicated to client 2 that data object A has been updated, subsequent reads on client 2 return the new value

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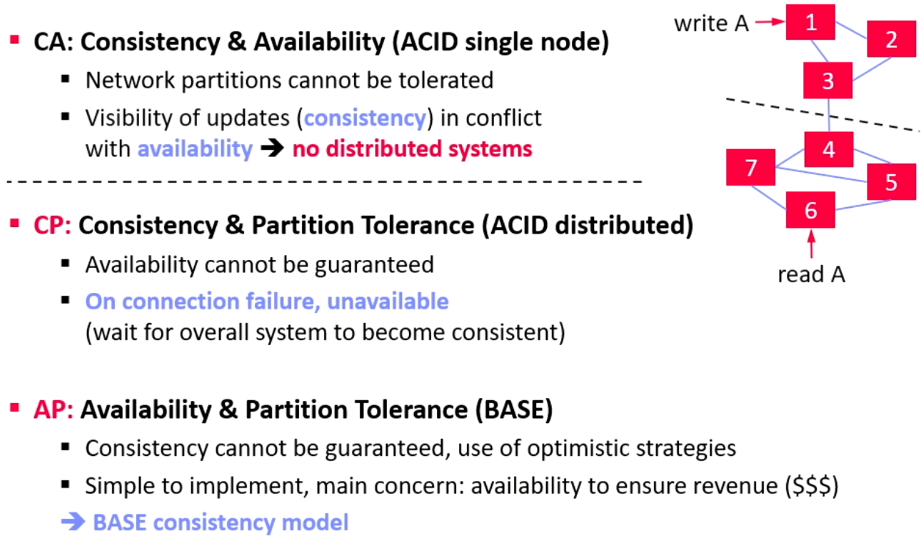
Two-Phase Commit Protocol

- distributed TX processing
  - n nodes with related but distributed data (vertical partitiong)
  - ensures consistent view
    - atomicity
    - durability
- two-phase commit (via 2n msgs)
  - prepare - check for success, log
  - commit - release locks and other cleanups
  - each node was successful ==> release locks
    - otherwise each node revert/prevent local changes
  - scaling problem
    - one node temporarily down ==> failure

Cap Theorem

- at most 2 of the following attributes

  - consistency - changes consistent among all nodes
  - availablity - services must be always availabe
  - partition tolerance - tolerance of temporarily unreachable noces
- possible combinations



- **CA: Consistency & Availability (ACID single node)**
  - Network partitions cannot be tolerated
  - Visibility of updates (**consistency**) in conflict with **availability** ➔ **no distributed systems**

- **CP: Consistency & Partition Tolerance (ACID distributed)**
  - Availability cannot be guaranteed
  - **On connection failure, unavailable** (wait for overall system to become consistent)

- **AP: Availability & Partition Tolerance (BASE)**
  - Consistency cannot be guaranteed, use of optimistic strategies
  - Simple to implement, main concern: availability to ensure revenue ($$$)

  ➔ **BASE consistency model**