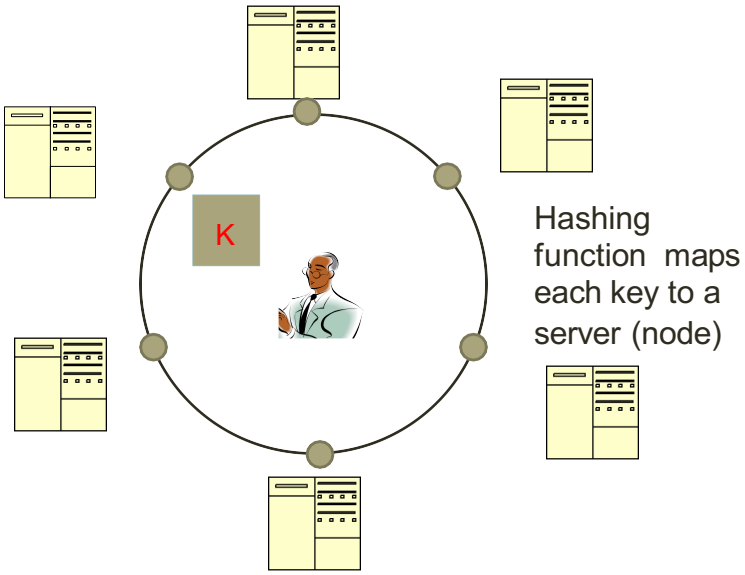
NoSQL

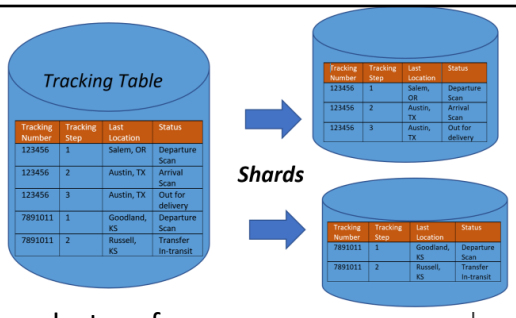
14

Typical NoSQL architecture



15

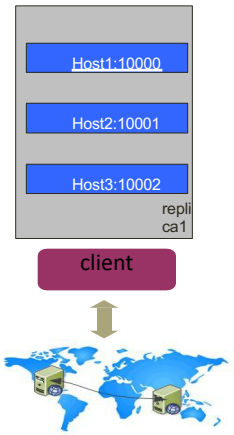
Sharding of data



- Distributes a single logical database system across a cluster of machines
- Uses range-based partitioning to distribute documents based
- on a specific shard key
- Automatically balances the data associated with each shard
- Can be turned on and off per collection (table)

17

Replica Sets



- Redundancy and Failover
- Zero downtime for upgrades and maintenance
- Master-slave replication
  - **Pros**: Strong Consistency
  - **Cons**: Delayed Consistency
- Geospatial features

18

CAP theorem for NoSQL

- **What the CAP theorem really says:**
  - If you cannot limit the number of faults and requests can be directed to any server and you insist on serving every request you receive then you cannot possibly be consistent

Eric Brewer 2001

How it is interpreted:

- You must always give something up: consistency, availability or tolerance to failure and reconfiguration

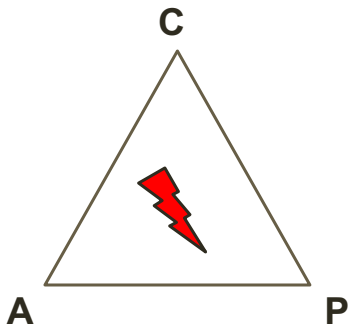
19

Theory of NOSQL: CAP

GIVEN:

- Many nodes
- Nodes contain replicas of partitions of the data

- **Consistency**
  - All replicas contain the same version of data
  - Client always has the same view of the data (no matter what node)
- **Availability**
  - System remains operational on failing nodes
  - All clients can always read and write
- **Partition tolerance**
  - multiple entry points
  - System remains operational on system split (communication malfunction)
  - System works well across physical network partitions



CAP Theorem: satisfying all three at the same time is impossible

20