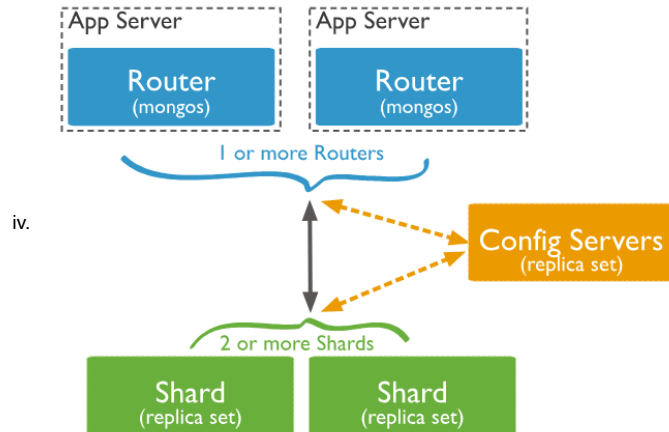# Clustering

Tuesday, October 28, 2025 4:05 AM

1. Clustering
    a. Always a 3 shared cluster (3 minimum)
        i. **Shard:** Each shard contains a subset of the sharded data. Each shard must be deployed as a replica set.
        ii. **Routing with mongos:** The mongos acts as a query router, providing an interface between client applications and the sharded cluster.
        iii. **Config servers:** Config servers store metadata and configuration settings for the cluster. Config servers must be deployed as a replica set (CSRS).
    b. Why clustering
        i. To avoid single point of failure.
        ii. To boost performance while querying.
    c. Sharding
        i. Using shard keys: consist of a field or multiple fields in documents
        ii. Missing shard key fields are treated as having null values
            1. Reshard a collection
        iii. Shard key Index
            1. Choice of shard key affects performance and scalability of the cluster
            2. Shard key index plays a crucial role in querying
            3. Refer to this guide:
                a. https://www.mongodb.com/docs/manual/core/sharding-choose-a-shard-key/#std-label-sharding-shard-key-selection
        iv.

        v. Refer to the sharding guide:
            1. https://www.mongodb.com/docs/manual/sharding/
    d. Advantages of Sharding
        i. MongoDB distributes the R/W ops across the shards in the cluster
            1. This allows them to process a subset of cluster operations
            2. Both R/W workloads can be scaled horizontally across the cluster.
                a. Targeted ops more efficient than broadcasting to every shard
            3. Increase storage capacity
            4. High Availability
2. Streaming Data
    a. Integrations with Apache Kafka
    b. Respond to real time events with triggers