Consistent Hashing - Discussion Topics

Algorithm & Design

1. **Why does modulo hashing fail in distributed systems?**
    - Calculate the percentage of keys remapped when adding/removing nodes
    - Impact on cache hit rates and database performance
2. **How do virtual nodes improve load distribution?**
    - Trade-offs between number of vnodes and memory usage
    - Handling heterogeneous hardware with different capacities
3. **Compare consistent hashing with rendezvous hashing**
    - When would you choose one over the other?
    - Implementation complexity differences

Real-World Scenarios

1. **Design a distributed cache using consistent hashing**
    - How to handle hot keys that receive disproportionate traffic?
    - Replication strategy for fault tolerance
2. **How does Cassandra use consistent hashing for data partitioning?**
    - Token ranges and vnode configuration
    - Impact on read/write performance
3. **What happens during a network partition in a consistent hash ring?**
    - Split-brain scenarios
    - Consistency vs availability trade-offs

Implementation Challenges

1. **How do you synchronize ring metadata across nodes?**
    - Gossip protocols vs centralized coordination
    - Handling temporary inconsistencies
2. **Describe a data migration strategy when adding nodes**
    - Background migration vs lazy migration
    - Minimizing impact on live traffic
3. **How would you implement weighted consistent hashing?**
    - Supporting servers with different capacities
    - Dynamic weight adjustment

Advanced Topics

1. **What is jump consistent hashing and when would you use it?**
    - Memory efficiency compared to ring-based approach
    - Limitations and use cases