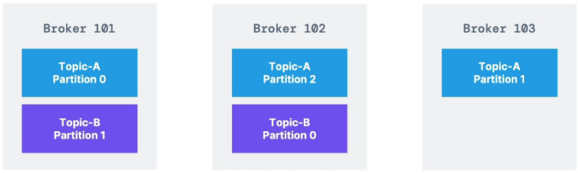
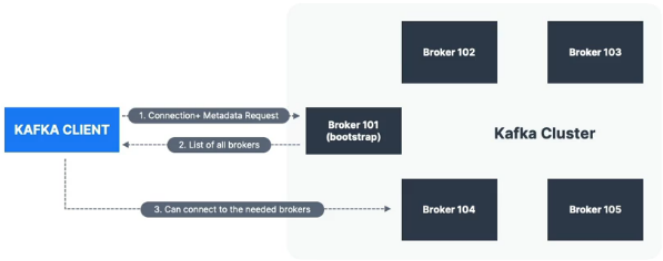
Kafka Theory Part 2

Brokers & Topics

- Brokers
  - Kafka cluster = multiple brokers(servers)
  - Each Broker is identified with ID
  - Each broker contains certain topic partition
  - After connection to any broker, you are connected to entire cluster
- Example: Topic A (3 partition)- and Topic B (2 partition)



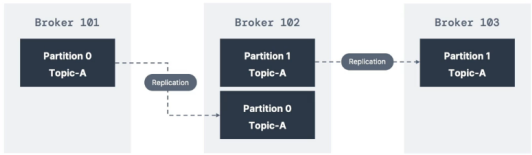
- Broker discovery: each broker is bootstrap servers. that means you only need to connect to one broker and clients will know how to connect to entire cluster



- Each broker knows all brokers, topic and partition

Topic replication Factor

- Topics should have rep factor > 1
- If the broker is down, another broker servers
- Ex: Topic A with 2 part & repl factor 2



- Leader for a partition
  - One broker can be a leader at a given time
  - Producer write data to leader broker (by default)

- Each replica is called ISR (in sync replica)
- Kafka consumer will read from leader broker (by default)
- Kafka replica fetching (new Feature) Kafka 2.4 - Allows Consumer to read from closest replica (To improve latency and decrease network costs)

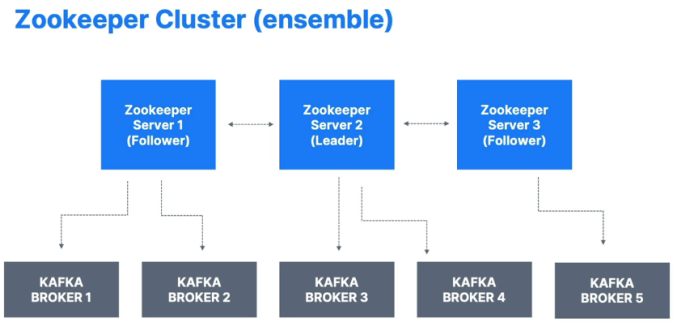
Producer Acks

- acks=0: Producer wont wait for acks (possible data loss)
- acks=1: Producer will wait for leader acknowledgement (limited data loss)
- acks=all: Leader + replicas acknowledgement (no data loss)

Topic Durablity

- Generally, repl factor of N => Topic durablity = N-1 Ex: Topic with Repl factor: 3, topic can withstand 2 brokers loss

Zookeeper

- Zookeeper manages brokers
- Zookeeper helps in performing leader election for partitions
- Zookeeper sends notification in case of changes (new topic, broker dies, broker comes up, etc)
- Kafka 2.x (Zookeeper) Vs Kafka 3.x (Zookeper or KRaft) Vs Kafka 4.x (No Zookeeper)
- Zookeeper by design operates with odd number of servers (1,3,5,7)
- 

- Never use Zookeeper as config in kafka clients and other programs that connect to Kafka

KRaft

- 2020, To remove Zookeeper dependency
- Scaling issues with Kafka + Zookeeper > 100000 paritition
- Without Zookeeper, Scales to Millions

- Security Model, Stablity, Single process to start, Faster controller shutdown and recovery time