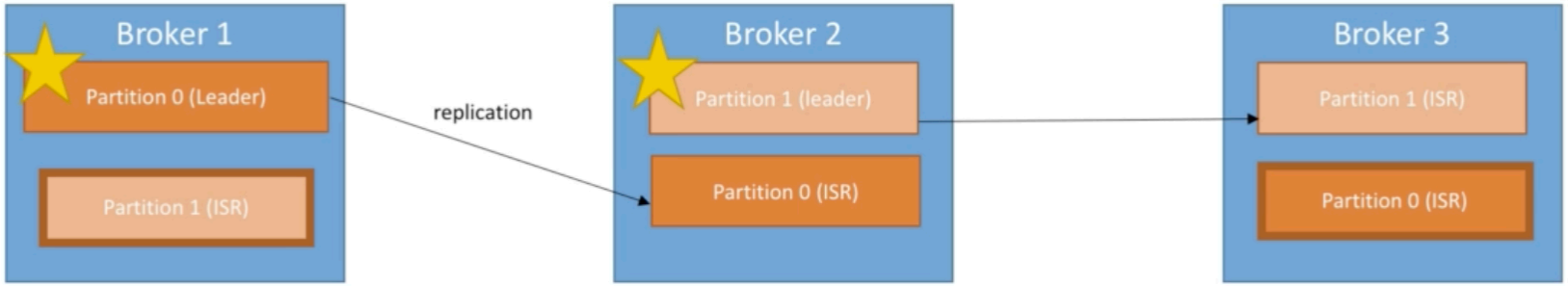
Partitions Count, Replication Factor

- The <u>two most important</u> parameters when creating a topic.
- They impact performance and durability of the system overall



- It is best to get the parameters right the first time!
  - If the Partitions Count increases during a topic lifecycle, you will break your keys ordering guarantees
  - If the Replication Factor increases during a topic lifecycle, you put more pressure on your cluster, which can lead to unexpected performance decrease

Partitions Count

- Each partition can handle a throughput of a few MB/s (measure it for your setup!)
- More partitions implies:
  - Better parallelism, better throughput
  - Ability to run more consumers in a group to scale
  - Ability to leverage more brokers if you have a large cluster
  - BUT more elections to perform for Zookeeper
  - BUT more files opened on Kafka

- Guidelines:
  - **Partitions per topic = MILLION DOLLAR QUESTION**
    - (Intuition) Small cluster (< 6 brokers): 2 x # brokers
    - (Intuition) Big cluster (> 12 brokers): 1 x # of brokers
    - Adjust for number of consumers you need to run in parallel at peak throughput
    - Adjust for producer throughput (increase if super-high throughput or projected increase in the next 2 years)
  - **TEST!** Every Kafka cluster will have different performance.
  - Don't create a topic with 1000 partitions!

Replication Factor

- Should be at least 2, usually 3, maximum 4
- The higher the replication factor (N):
  - Better resilience of your system (N-1 brokers can fail)
  - BUT more replication (higher latency if acks=all)
  - BUT more disk space on your system (50% more if RF is 3 instead of 2)

- Guidelines:
  - **Set it to 3 to get started** (you must have at least 3 brokers for that)
  - If replication performance is an issue, get a better broker instead of less RF
  - **Never set it to 1 in production**

Clusters guidelines

- It is pretty much accepted that a broker should not hold more than 2000 to 4000 partitions (across all topics of that broker).
- Additionally, a Kafka cluster should have a maximum of 20,000 partitions across all brokers.
- The reason is that in case of brokers going down, Zookeeper needs to perform a lot of leader elections

- If you need more partitions in your cluster, add brokers instead
- If you need more than 20,000 partitions in your cluster (it will take time to get there!), follow the Netflix model and create more Kafka clusters.

- Overall, you don't need a topic with 1000 partitions to achieve high throughput. Start at a reasonable number and test the performance