

## Controller Broker

Inside Kafka Cluster, one broker is elected as Controller. Its is responsible for admin operations, such as creating/deleting a topic, adding Partition, assigning leaders to partitions, monitoring broker failure etc. Furthermore, the controller periodically checks health of other Brokers, if it doesn't receive a response from a broker, it performs a failover to another broker. It also communicates the result of partition leader election to other brokers.

## Split Brain

When a Controller broker dies, Kafka cluster elects a new controller. Thus in this scenario cluster has to move in to appoint a new Controller broker. If the old Controller restores after some time, at that time we have two Controller brokers, and older doesn't have latest data, but it will work as a Controller Broker and thus when both old and new Controller brokers will do their work, they will conflict and data inconsistency comes in, this scenario is called **Split Brain**.

## Generation Clock

To Control Split Brain, we use generation clock, which is simply a increase in number to indicate a server generation. In Kafka, Its is implemented by Epoch numbers. If old has epoch number as 1, new will have epoch number as 2, thus the brokers can identify the highest incoming number is the Controller broker. The Epoch number is stored in Zookeeper.