Kafka Architecture Diagram :

A diagram of a company

AI-generated content may be incorrect.

**🔹 1. ZooKeeper (Top)**

* Manages and coordinates the Kafka cluster.
* Handles:
  + **Broker metadata**
  + **Leader election**
  + **Configuration management**

In newer Kafka versions (KRaft mode), ZooKeeper is no longer required.

**🔹 2. Brokers**

* Kafka cluster is made up of multiple **brokers** (servers).
* Each broker hosts:
  + **Topics**
  + **Partitions**
  + Data storage
* One of the brokers is elected as the **Controller** by ZooKeeper.

**3. Producer**

* Sends messages to Kafka topics.
* The producer connects to brokers and decides:
  + Which **topic** to send data to.
  + Which **partition** within the topic to use (based on key or round-robin).

**🔹 4. Topic**

* Logical category to which messages are sent by producers.
* A topic can have **multiple partitions** to:
  + Support parallelism
  + Ensure scalability

**🔹 5. Partition**

* A partition is a **log** where Kafka stores messages in **append-only** fashion.
* Each partition has:
  + A **leader** (one broker) and
  + Optional **replicas** (on other brokers for fault tolerance).

**🔹 6. Consumer**

* Fetches data from **partitions** of a topic.
* Can be part of a **consumer group** for load balancing.

**7. Flow Summary**

1. **Producer** sends messages → to **Topic** → divided into **Partitions**.
2. **Brokers** manage the partitions.
3. **ZooKeeper** oversees the whole cluster.
4. **Consumer** reads messages from **Partitions**.

Steps to run Kafka and Java project :-

Go to the folder where Kafka folder is kept and run below command   
  
**✅ For ZooKeeper:**

cmd

java -Dlog4j.configuration=file:config/log4j.properties -cp "libs/\*" org.apache.zookeeper.server.quorum.QuorumPeerMain config/zookeeper.properties

**✅ For Kafka broker:**

cmd

java -Dlog4j.configuration=file:config/log4j.properties -cp "libs/\*" kafka.Kafka config/server.properties

If you are using maven then add below Kafka dependency in pom.xml file of your project. I have also added project (KafkaJavaApp) in my repo for reference.  
  
<dependencies>

<dependency>

<groupId>org.apache.kafka</groupId>

<artifactId>kafka-clients</artifactId>

<version>3.0.0</version>

</dependency>

</dependencies>  
  
To compile and run:

Bash

mvn clean compile

mvn clean install

mvn exec:java -Dexec.mainClass=”producer and consumer package path "