APACHE KAFKA USING SPRING-BOOT

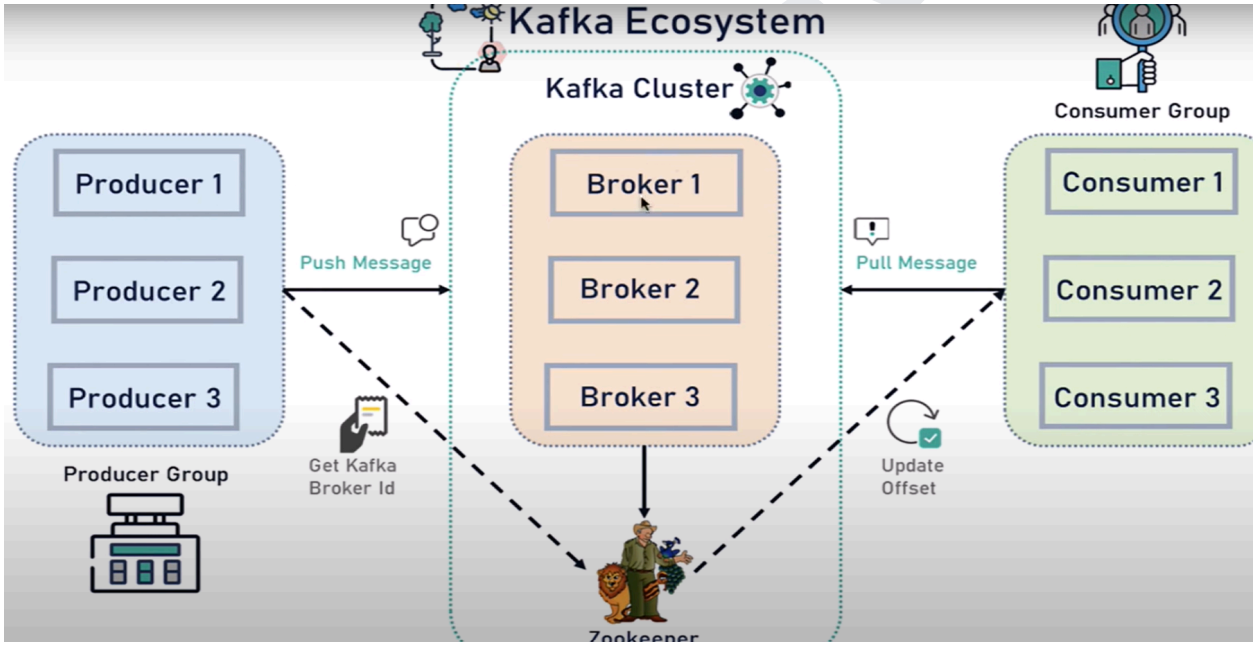
What is kafka ?
Kafka Is a Distributed message broker or publisher subscriber system.

Kafka ecosystem :
Three Components

1) Publisher :who publish the data
2) Subscriber :who consumes a data
3) Broker : interface between both of them

Zookeeper : manage the state of kafka brokers

Publisher push the data and consumer pull the data they both read and communicate in the form of messages and the topics



Use Case:
1)messaging
2)website Activity Tracking
3)Metrics

Kafka Cluster :
Cluster consist of set of broker (minimum 3 brokers)

Kafka broker (kafka server)
The producer and consumer don't interact directly . they use kafka server as an agent or a broker to exchange messages

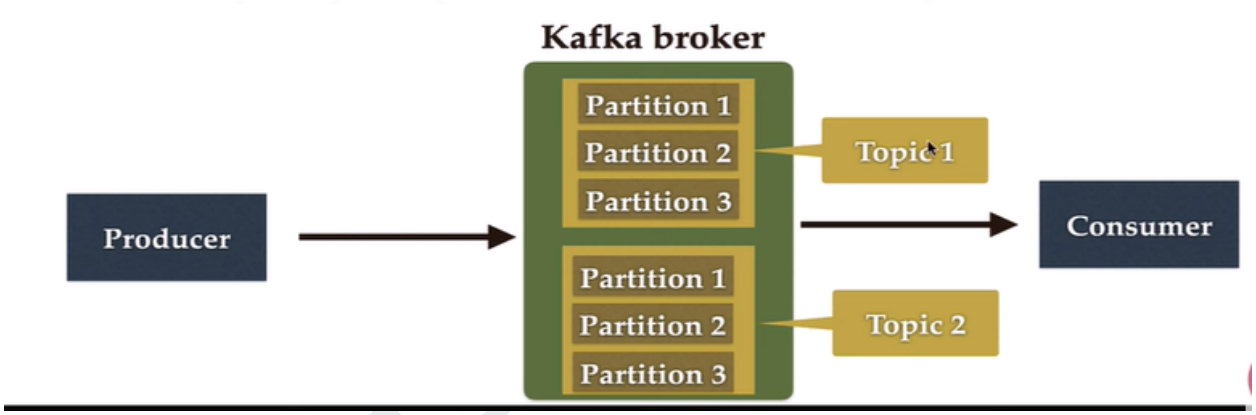
producer ▶️ ▶️ kafka broker ▶️ ▶️ consumer

How is the data store in the broker ?

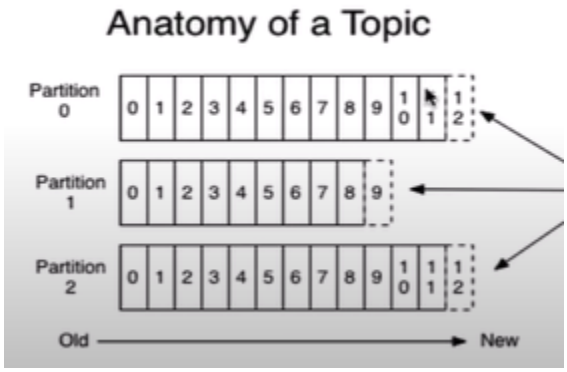
1) **Kafka topic :**
   - It is like a table in a database or folder in a file system .
   - it identified by a name
   - can have any number of topic

Kafka Partitions

kafka topics divided into number of partitions which contain record in an unchangeable sequence



Offsets : sequence of id given to msg . Once the offset is assigned it will never be changed . the first message gets an offset zero



writes

Consumer Groups :

Contains one or more consumer working together to process the messages

INSTALL AND SETUP

1)apache kafka link : https://kafka.apache.org/downloads
2) after installation

https://www.geeksforgeeks.org/how-to-install-and-run-apache-kafka-on-windows/

Start the zookeeper :(using cmd)
C:\kafka_2.12-3.9.0\bin\windows>zookeeper-server-start.bat
C:\kafka_2.12-3.9.0\config\zookeeper.properties

Start

Create SPRING project using Spring IO :

Refer this website : https://spring.io/projects/spring-kafka

spring-boot application properties :

```
spring.kafka.consumer.bootstrap-servers: localhost:9092
spring.kafka.consumer.group-id=myGroup
spring.kafka.consumer.auto-offset-reset : earliest
spring.kafka.consumer.key-deserializer :
org.apache.kafka.common.serialization.StringDeserializer
spring.kafka.consumer.value-deserializer :
org.apache.kafka.common.serialization.StringDeserializer

spring.kafka.producer.bootstrap-servers: localhost:9092
spring.kafka.producer.key-serializer : org.apache.kafka.common.serialization.StringSerializer
spring.kafka.producer.value-serializer : org.apache.kafka.common.serialization.StringSerializer
```

Controller :

```
@RestController
@RequestMapping("/kafka")
public class KafkaController {
   @Autowired
   private KafkaProducer producer;
```

```
    @PostMapping("/send")
    public ResponseEntity<String> send(@RequestBody String message) {
        producer.send("test-topic", message);
        return ResponseEntity.ok("Message sent!");
    }
}
```

Producer Service class :

```
@Service
public class KafkaProducer {
    @Autowired
    private KafkaTemplate<String, String> kafkaTemplate;

    public void send(String topic, String payload) {
        kafkaTemplate.send(topic, payload);
    }
}
```

Consumer Service Class

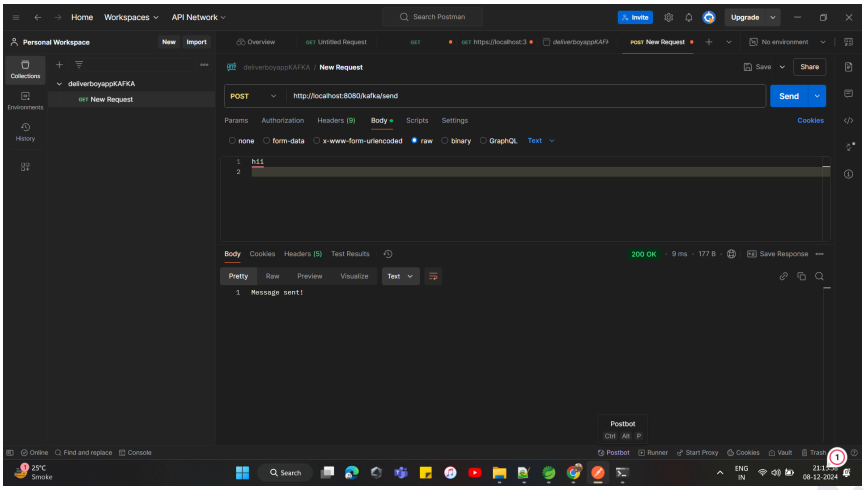
```
@Service
public class KafkaConsumer {

        private static Logger LOGEER = LoggerFactory.getLogger(KafkaConsumer.class);
    @KafkaListener(topics = "test-topic", groupId = "spring-kafka-poc-group")
    public void listen(String message) {
        LOGEER.info(String.format("message received - > %s", message));

    }
}
```

Testing :

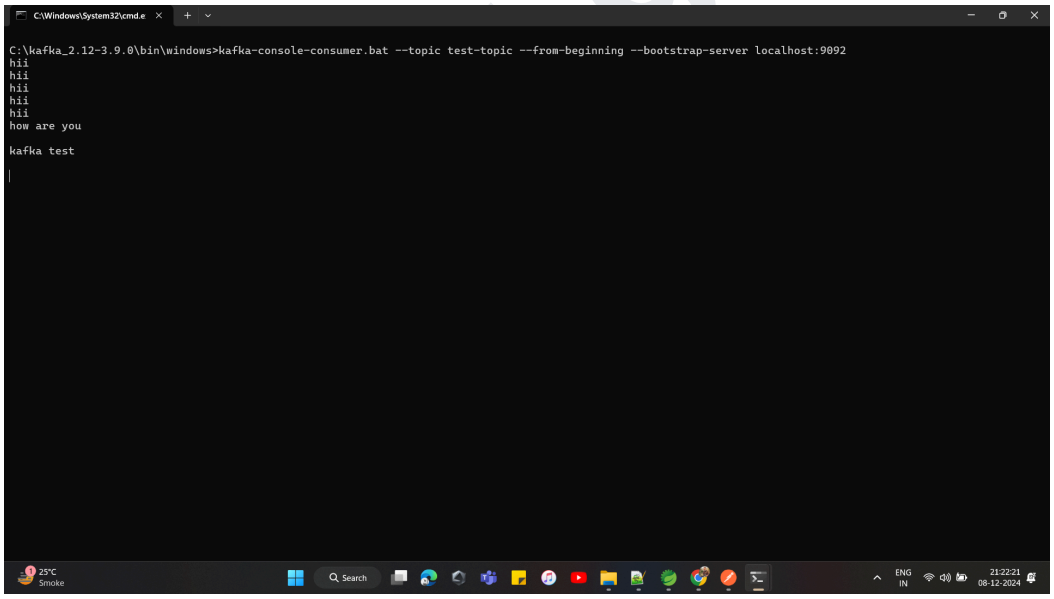
1) **Hit the API**



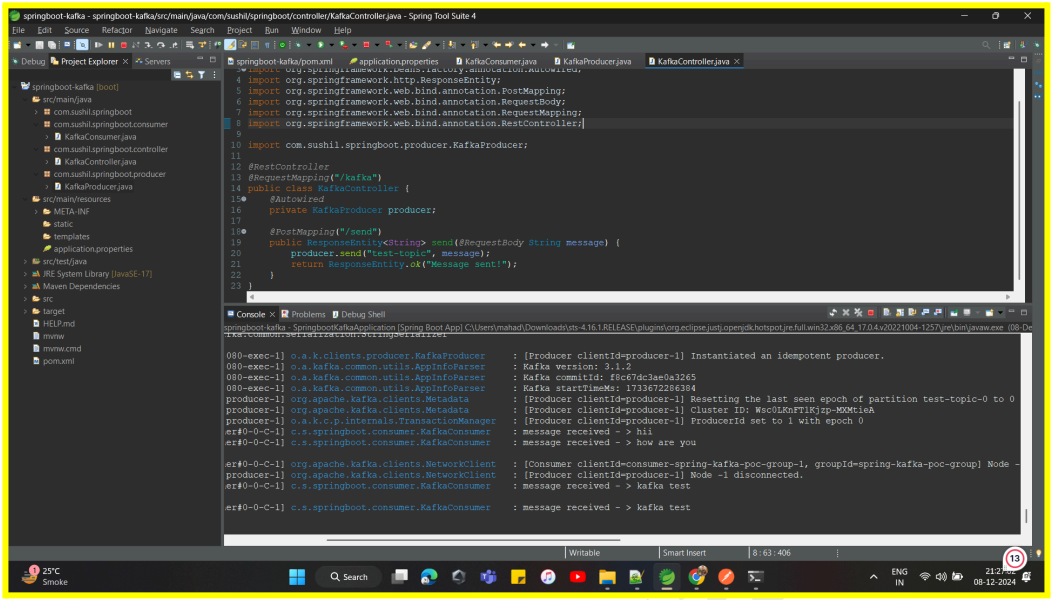
2)Read the events in topic which we have created

kafka-console-consumer.bat --topic <topic name> --from-beginning --bootstrap-server localhost:9092

Ex.
kafka-console-consumer.bat --topic test-topic --from-beginning --bootstrap-server localhost:90



3) check in console the msg is received :



CONFIGURE KAFKA PRODUCER AND CONSUMER FOR JSON SERIALIZER AND DESERIALIZER

Kafka stores and transport byte[]. There are a number of built-in serializers and deserializers but it doesn't include any for Json .

Spring Kafka simplifies this by offering `JsonSerializer` and `JsonDeserializer` to handle JSON data:

- **Sending JSON**: Use `JsonSerializer` to convert a Java object into JSON (`byte[]`) and send it to a Kafka topic.
- **Receiving JSON**: Use `JsonDeserializer` to convert JSON (`byte[]`) back into a Java object automatically.

Producer Service class for Json :

```
package com.sushil.springboot.kafka;

import org.slf4j.Logger;
import org.slf4j.LoggerFactory;
import org.springframework.beans.factory.annotation.Autowired;
import org.springframework.kafka.core.KafkaTemplate;
import org.springframework.kafka.support.KafkaHeaders;
import org.springframework.messaging.Message;
import org.springframework.messaging.support.MessageBuilder;
import org.springframework.stereotype.Service;

import com.sushil.springboot.forJsonDTO.User;

@Service
public class JsonKafkaProducer {

	private static final Logger LOGGER =
LoggerFactory.getLogger(JsonKafkaProducer.class);

	@Autowired
	private KafkaTemplate<String, User> kafkaTemplate;

	public void sendMessage(User data) {
	    try {
		LOGGER.info(String.format("Message to be sent -> %s", data.toString()));

		Message<User> message = MessageBuilder
			.withPayload(data)
			.setHeader(KafkaHeaders.TOPIC, "test-topic")
			.build();

		kafkaTemplate.send(message);
		LOGGER.info("Message sent successfully to topic: sushil");
	    } catch (Exception e) {
		LOGGER.error("Failed to send message to topic: sushil. Error: {}", e.getMessage(),
e);
	    }
	}



}
```

The Consumer class remains the same as above Just add the following code:

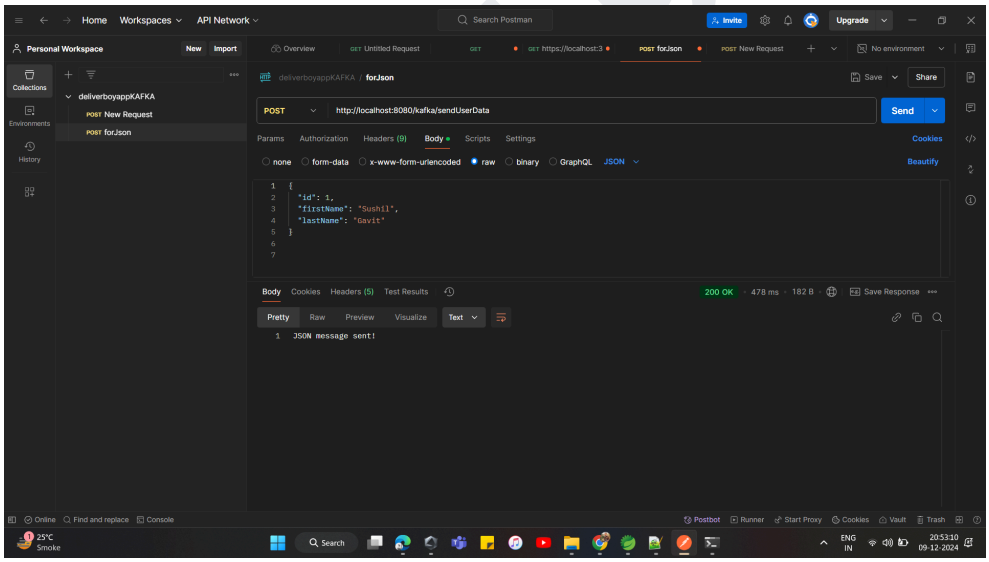
```
@KafkaListener(topics = "test-topic_json", groupId = "spring-kafka-poc-group")
public void listenJson(User user) {
    try {
        LOGGER.info(String.format("Message received -> %s",user));

    } catch (Exception e) {

        LOGGER.error("Error occurred while processing the message: {}", e.getMessage(),
e);
    }
}
```

Testing :

2) **Hit the API**



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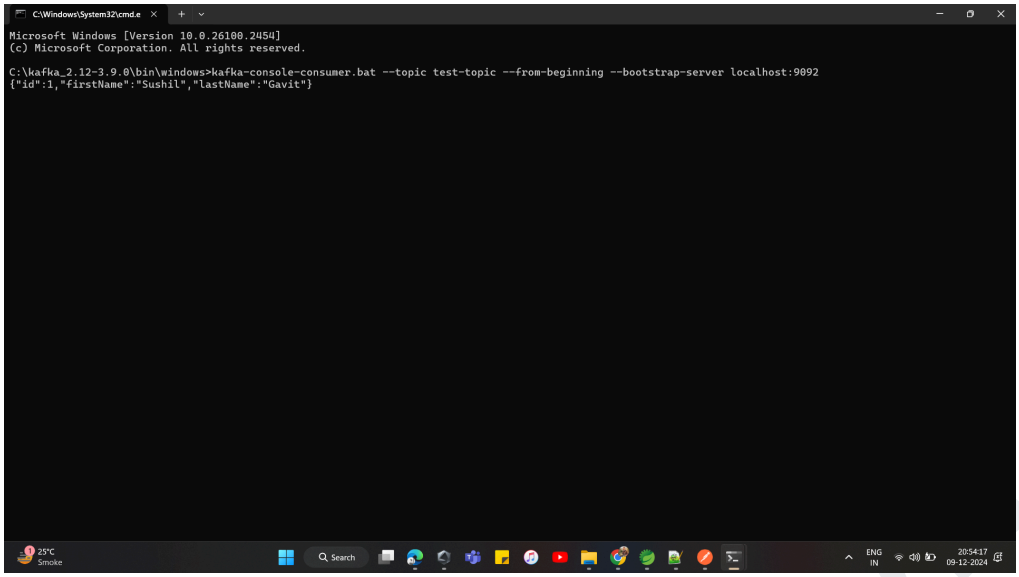
kafka-console-consumer.bat --topic <topic name> --from-beginning --bootstrap-server localhost:9092

Ex.

kafka-console-consumer.bat --topic test-topic --from-beginning --bootstrap-server localhost:90



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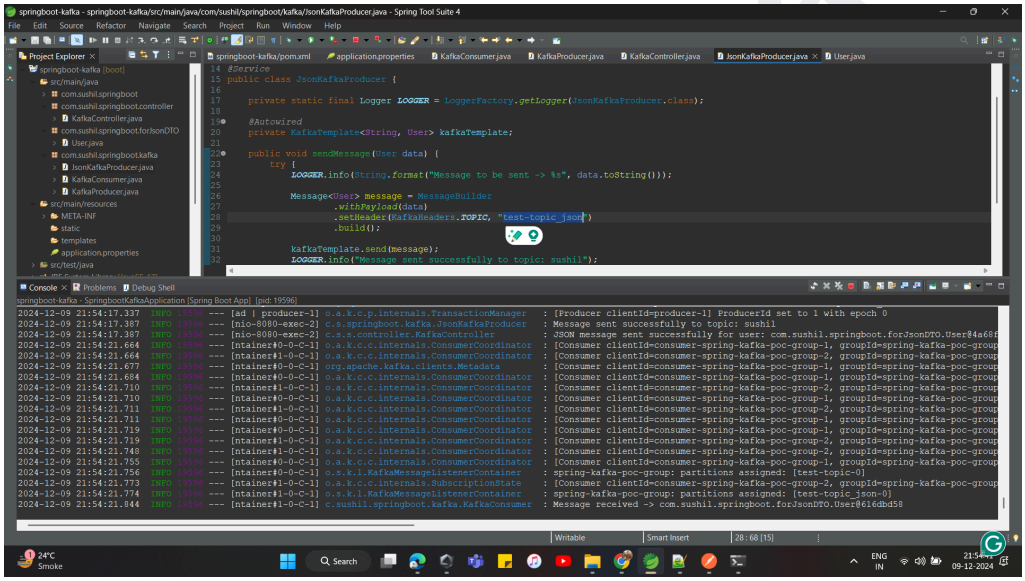

Connect :

lg : @sushil_gavit **github : https://github.com/Sushilgavit**