Problem Statement

There is a scenario where thousands of trades are flowing into one store, assume any way of transmission of trades (could be receiving the trades via Kafka or MQ or...).

We need to create a one trade store, which stores the trade (any kind of database) in the following order:

Trade Id	Version	Counter-Party Id	Book-Id	Maturity Date	Created Date	Expired
T1	1	CP-1	B1	20/05/2020	today date	N
T2	2	CP-2	B1	20/05/2021	today date	N
T2	1	CP-1	B1	20/05/2021	14/03/2015	N
T3	3	CP-3	B2	20/05/2014	today date	Y

Application to be created:

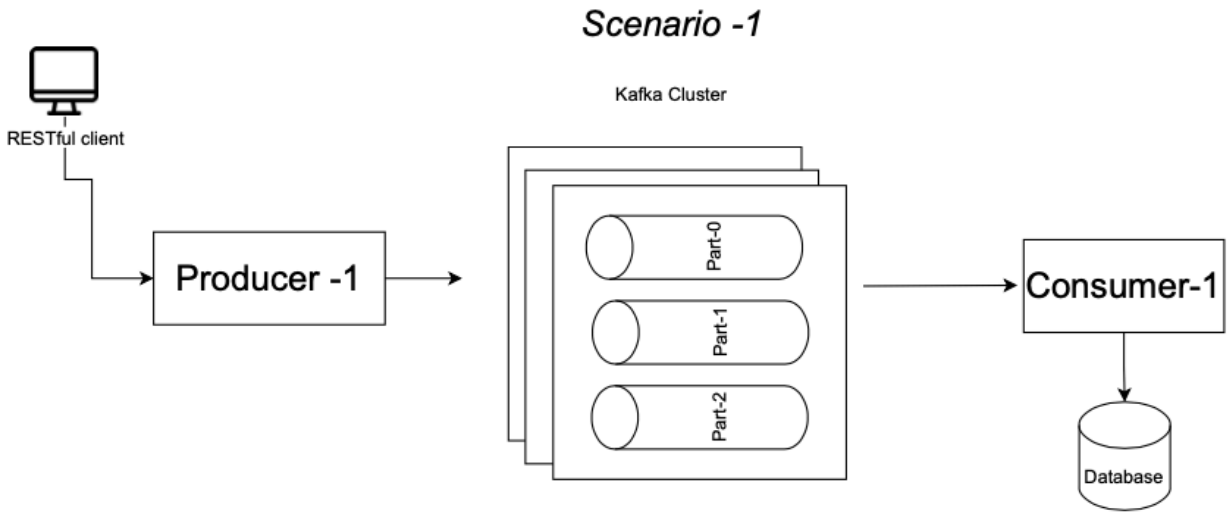
1. Producer
2. Consumer
3. Validation to be applied
4. Junit test Case to be written on Components
5. Architecture document

1. Solutions

- **Producer:** Spring Boot java application implemented. The application name is "producer"
- **Consumer:** Spring Boot java application implemented. The application name is "consumer"
- **Validation to be applied :** Transaction management has been made using "KafkaTransactionManager". AOP approach was applied for "Exception Handling" on the producer side, Specific Spring component name is "ControllerAdvice". Exception handling implemented in both side producer and consumer.
- **Junit test Case to be written on Components** Unit test methods have been developed under the test project in both projects.
- **Architecture document:** The architectural structure is presented in this document.

2. Scenario 1

- We have one "producer" and one "consumer". They communicate using 3 Kafka Broker, 3 Partition



2.1 Implementation Details

2.1.1 Producer

Configuration: application.propertis

```
server.port=8081
spring.kafka.producer.bootstrap-servers= localhost:9092, localhost:9093,
localhost:9094
spring.kafka.producer.key-serializer=
org.apache.kafka.common.serialization.StringSerializer
spring.kafka.producer.value-serializer=
org.springframework.kafka.support.serializer.JsonSerializer

trade.topic.name= trade-topic
trade.topic.partition.count= 3
# We will set different hashkey for different producer instances
trade.topic.producer.target.partition.hashkey= P1
```

Spring RestController for RESTful api requests

```
@RestController
public class TradeController {

  private final Logger logger =
LoggerFactory.getLogger(TradeController.class);

  private TradeProducerService tradeService;
```

```
  @Autowired
  public TradeController(TradeProducerService tradeService) {
    this.tradeService = tradeService;
  }

  @PostMapping(path = "/post-trade")
  public void sendTrade(@RequestParam("tradeId") String tradeId,
      @RequestParam("version") int version,
      @RequestParam("counterParty") String counterParty,
      @RequestParam("bookId") String bookId,
      @RequestParam("maturityDate")
      @DateTimeFormat(iso = DateTimeFormat.ISO.DATE) LocalDate maturityDate,
      @RequestParam("createdDate")
      @DateTimeFormat(iso = DateTimeFormat.ISO.DATE) LocalDate createdDate,
      @RequestParam("expiredFlag") String expiredFlag) {

    Trade trade = new Trade();
    trade.setTradeId(tradeId);
    trade.setVersion(version);
    trade.setCounterParty(counterParty);
    trade.setBookId(bookId);
    trade.setMaturityDate(maturityDate);
    trade.setCreatedDate(createdDate);
    trade.setExpiredFlag(expiredFlag);

    logger.info(String.format("RESTful request -> %s", trade));

    // Validation applied
    if (tradeService.isValid(trade)) {
      logger.info("Trade is VALID trade:" + trade.toString());
      this.tradeService.sendMessageWithCallBack(trade);

    } else {
      // look for TradeControllerAdvice
      logger.error("ERROR tradeid:" + trade.getTradeId()
          + " Store should not allow the trade which has less maturity date
then today date");
      throw new InvalidTradeException("ERROR tradeid:" + trade.getTradeId()
          + " Store should not allow the trade which has less maturity date
then today date");
    }

  }
}
```

Transactional Service layer: `Asynchronous Kafka call`

```
@Service
public class TradeProducerService {
```

```
  private static final Logger logger =
LoggerFactory.getLogger(TradeProducerService.class);

  @Value(value = "${trade.topic.name}")
  private String tradeTopicName;

  @Autowired
  private KafkaTemplate<String, Trade> kafkaTemplate;

  // Synchronize
  public void sendMessage(Trade trade) {
    this.kafkaTemplate.send(tradeTopicName, trade);
    logger.info(String.format("Trade sent -> %s", trade));
  }

  // Asynchronous
  @Transactional
  public void sendMessageWithCallBack(Trade trade) {
    ListenableFuture<SendResult<String, Trade>> future =
this.kafkaTemplate.send(tradeTopicName, trade);
    future.addCallback(new ListenableFutureCallback<SendResult<String, Trade>>
() {

      @Override
      public void onSuccess(SendResult<String, Trade> result) {
        logger.info("Kafka sent: " + trade + " with offset: " +
result.getRecordMetadata().offset());
      }

      @Override
      public void onFailure(Throwable ex) {
        logger.error("Kafka sent error: " + trade, ex);
      }
    });
  }

  public boolean isValid(Trade trade) {
    if (validateMaturityDate(trade)) {
      if (trade.getTradeId() != null) {
        return validateVersion(trade);
      } else {
        return true;
      }
    }
    return false;
  }

  private boolean validateVersion(Trade trade) {
```

```
    // Version validation
    if (trade.getVersion() > 0) {
      return true;
    }
    return false;
  }

  private boolean validateMaturityDate(Trade trade) {
    // Store should not allow the trade which has less maturity date then
today date
    return trade.getMaturityDate().isBefore(LocalDate.now()) ? false : true;
  }
}
```

Producer Configuration with `KafkaTransactionManager`

```
@Configuration
public class KafkaProducerConfig {

  @Value(value = "${spring.kafka.producer.bootstrap-servers}")
  private String bootstrapAddress;

  @Bean
  public ProducerFactory<String, Trade> tradeProducerFactory() {
    Map<String, Object> configProps = new HashMap<>();
    configProps.put(ProducerConfig.BOOTSTRAP_SERVERS_CONFIG,
bootstrapAddress);
    configProps.put(ProducerConfig.KEY_SERIALIZER_CLASS_CONFIG,
StringSerializer.class);
    configProps.put(ProducerConfig.VALUE_SERIALIZER_CLASS_CONFIG,
JsonSerializer.class);

    DefaultKafkaProducerFactory<String, Trade> factory = new
DefaultKafkaProducerFactory<>(configProps);
    factory.transactionCapable();
    factory.setTransactionIdPrefix("tran-");

    return factory;
  }

  @Bean
  public KafkaTransactionManager<String, Trade>
transactionManager(ProducerFactory<String, Trade> producerFactory) {
    KafkaTransactionManager<String, Trade> manager = new
KafkaTransactionManager<String, Trade>(producerFactory);
    return manager;
  }

  @Bean
```

```
  public KafkaTemplate<String, Trade> tradeKafkaTemplate() {
    return new KafkaTemplate<>(tradeProducerFactory());
  }
}
```

Exception handling with Spring AOP Advice

```
@ControllerAdvice
@RequestMapping(produces = "application/vnd.error+json")
public class TradeControllerAdvice extends ResponseEntityExceptionHandler {

  @ExceptionHandler(InvalidTradeException.class)
  public ResponseEntity<String> notFoundException(final InvalidTradeException
e) {
    return error(e, HttpStatus.NOT_ACCEPTABLE);
  }

  @ExceptionHandler(IllegalArgumentException.class)
  public ResponseEntity<String> assertionException(final
IllegalArgumentException e) {
    return error(e, HttpStatus.NOT_ACCEPTABLE);
  }

  private ResponseEntity<String> error(final Exception exception, final
HttpStatus httpStatus) {
    final String message =
Optional.of(exception.getMessage()).orElse(exception.getClass().getSimpleName(
));

    HttpHeaders responseHeaders = new HttpHeaders();
    responseHeaders.set("Error", message);

    return new ResponseEntity<String>(responseHeaders, httpStatus);
  }

}
```

2.1.2 Consumer

Configuration: application.propertis

```
server.port=8082
spring.kafka.consumer.bootstrap-servers= localhost:9092, localhost:9093,
localhost:9094
# Every consumer group has a group coordinator. If a consumer stops sending
heartbeats, the coordinator will trigger a rebalance.
spring.kafka.consumer.group-id= trade-consumer-group
spring.kafka.consumer.auto-offset-reset= earliest
```

```
spring.kafka.consumer.key-deserializer=
org.apache.kafka.common.serialization.StringDeserializer
spring.kafka.consumer.value-deserializer=
org.springframework.kafka.support.serializer.JsonDeserializer
spring.kafka.consumer.properties.spring.json.trusted.packages=*

# Configuration for DLT (dead letter topic)
spring.kafka.producer.bootstrap-servers= localhost:9092, localhost:9093,
localhost:9094
spring.kafka.producer.key-serializer=
org.apache.kafka.common.serialization.StringSerializer
spring.kafka.producer.value-serializer=
org.springframework.kafka.support.serializer.JsonSerializer

trade.topic.name= trade-topic
trade.topic.name.dlt= trade-topic.dlt
trade.topic.name.dlt.group= trade-topic.dlt.group

spring.datasource.url=jdbc:postgresql://localhost:5432/postgres
spring.datasource.username=postgres
spring.datasource.password=123
spring.jpa.hibernate.ddl-auto=create-drop
spring.jpa.show-sql=true
spring.jpa.properties.hibernate.dialect=org.hibernate.dialect.PostgreSQLDialec
t
spring.jpa.properties.hibernate.format_sql=true
```

KaffaListener located in Service Layer, it consumes topic data, It has Consumer Group configuration as well.

We will send the failed message to another topic. We call this "trade-topic.dlt" dead letter topic.

```
@Service
@Transactional
public class TradeConsumerServiceImpl implements TradeConsumerService {

  private final Logger logger =
LoggerFactory.getLogger(TradeConsumerServiceImpl.class);

  public static final String HEADER_KEY_ORIGINAL_TOPIC = "ORIGINAL_TOPIC";
  public static final String HEADER_KEY_RETRY_COUNT = "RETRY_COUNT";

  private final TradeRepository tradeRepository;

  @Autowired
  public TradeConsumerServiceImpl(TradeRepository tradeRepository) {
    this.tradeRepository = tradeRepository;
```

```
  }

  public void saveTrade(Trade trade) {
    tradeRepository.save(trade);
    logger.info(String.format("Trade inserted to databse -> %s", trade));
  }

  public Trade findById(Long id) {
    return tradeRepository.findById(id).get();
  }

  @Transactional(rollbackFor = InvalidTradeException.class)
  @KafkaListener(topics = "${trade.topic.name}", groupId =
"${spring.kafka.consumer.group-id", containerFactory =
"kafkaListenerContainerFactory")
  @Override
  public void consume(Trade trade) throws InvalidTradeException {

    logger.info(String.format("Trade consume -> %s", trade));

    // Validation
    if (!isValid(trade)) {
      // KafkaConsumerConfig has custom ErrorHandler which is
"TradeErrorHandler"
      // in case of InvalidTradeException
      // TradeErrorHandler will put it into "trade.topic.name.dlt"
      throw new InvalidTradeException("Store should not allow the trade which
has expiredFlag=Y");
    }

    try {

      // Save Trade
      this.saveTrade(trade);
      logger.info(String.format("Trade inserted -> %s", trade));

    } catch (Exception e) {
      logger.error(String.format("Trade insert error -> %s", trade) +
e.getMessage(), e);
      // KafkaConsumerConfig has custom ErrorHandler which is
"TradeErrorHandler"
      // in case of InvalidTradeException
      // TradeErrorHandler will put it into "trade.topic.name.dlt"
      throw new InvalidTradeException(e.getMessage());
    }
  }
```

```
  @KafkaListener(groupId = "${trade.topic.name.dlt.group}", topics =
"${trade.topic.name.dlt}", containerFactory = "kafkaListenerContainerFactory")
  @Override
  public void dltListen(ConsumerRecord<?, ?> consumerRecord) {

    // We consume invalid Trade
    // We can trigger here Roll-back operations
    logger.info("Received Invalid Trade from DLT: " + consumerRecord.value());

    Header originalTopic =
consumerRecord.headers().lastHeader(HEADER_KEY_ORIGINAL_TOPIC);

    if (originalTopic != null) {
      String originalTopicName = new String(originalTopic.value(),
StandardCharsets.UTF_8);
      logger.info("Received Invalid Trade original topic: " +
originalTopicName);
    }

    Header retryCount =
consumerRecord.headers().lastHeader(HEADER_KEY_RETRY_COUNT);

    if (retryCount != null) {
      String count = new String(retryCount.value(), StandardCharsets.UTF_8);
      logger.info("Received Invalid Trade Retry count: " + count);
    }

  }

  private boolean isValid(Trade trade) {

    // We can add here all validations

    if (trade.getExpiredFlag().equals("N")) {
      return true;
    }

// Commented for test purpose
//    if (trade.getMaturityDate().isAfter(LocalDate.now())) {
//      return true;
//    }

    return false;

  }
}
```

Kafka Consumer Configuration

it has custom ErrorHandler: "TradeErrorHandler"

```
@EnableKafka
@Configuration
public class KafkaConsumerConfig {

  @Value(value = "${spring.kafka.consumer.bootstrap-servers}")
  private String bootstrapAddress;

  @Value(value = "${spring.kafka.consumer.group-id}")
  private String tradeGroupId;

  // Consumer-1

  public ConsumerFactory<String, Trade> consumerFactory() {
    Map<String, Object> props = new HashMap<>();
    props.put(ConsumerConfig.BOOTSTRAP_SERVERS_CONFIG, bootstrapAddress);
    props.put(ConsumerConfig.GROUP_ID_CONFIG, tradeGroupId);
    props.put(JsonDeserializer.TRUSTED_PACKAGES, "*");
    props.put(ConsumerConfig.MAX_POLL_RECORDS_CONFIG, 1);
    props.put(ConsumerConfig.ENABLE_AUTO_COMMIT_CONFIG, false);
    return new DefaultKafkaConsumerFactory<>(props, new StringDeserializer(),
new JsonDeserializer<>(Trade.class));
  }

  @Bean
  public ConcurrentKafkaListenerContainerFactory<String, Trade>
kafkaListenerContainerFactory(
      TradeErrorHandler tradeErrorHandler) {
    ConcurrentKafkaListenerContainerFactory<String, Trade> factory = new
ConcurrentKafkaListenerContainerFactory<>();
    factory.setConcurrency(2);
    factory.setConsumerFactory(consumerFactory());
    factory.setErrorHandler(tradeErrorHandler);
    return factory;
  }


  // Additional consumers will be added to below

  // Consumer-2

  // Consumer-3

}
```

Custom Error Handler for RollBack scenario

```
@Service
public class TradeErrorHandler implements ErrorHandler {

  private static final Logger logger =
LoggerFactory.getLogger(KafkaConsumerConfig.class);

  public static final String HEADER_KEY_ORIGINAL_TOPIC = "ORIGINAL_TOPIC";
  public static final String HEADER_KEY_RETRY_COUNT = "RETRY_COUNT";

  @Value(value = "${trade.topic.name.dlt}")
  private String tradeTopicDltName;

  @Autowired
  private KafkaTemplate<String, String> kafkaTemplate;

  @Override
  public void handle(Exception thrownException, ConsumerRecord<?, ?> data) {

    if (thrownException instanceof ListenerExecutionFailedException
        && thrownException.getCause() instanceof InvalidTradeException) {

      ConsumerRecord<?, ?> cr = (ConsumerRecord<?, ?>) data;
      Trade trade = (Trade) cr.value();

      ProducerRecord<String, String> producerRecord = new ProducerRecord<>
(tradeTopicDltName, trade.toString());

      Header retryCount = cr.headers().lastHeader(HEADER_KEY_RETRY_COUNT);

      if (retryCount != null) {
        producerRecord.headers().add(retryCount);
      } else {
        producerRecord.headers().add(HEADER_KEY_RETRY_COUNT,
"0".getBytes(StandardCharsets.UTF_8));
      }

      producerRecord.headers().add(HEADER_KEY_ORIGINAL_TOPIC,
cr.topic().getBytes(StandardCharsets.UTF_8));

      // invalid trade sent to Kafka DLT topic
      this.kafkaTemplate.send(producerRecord);

      logger.info(String.format("## DTL Trade sent -> %s", trade));

    } else {
      ByteArrayOutputStream os = new ByteArrayOutputStream();
      PrintStream ps = new PrintStream(os);
      thrownException.printStackTrace(ps);
      try {
```

```
        String output = os.toString("UTF8");
        logger.error("========= Error processing message: =======" + "\n" +
thrownException.getMessage() + "\n"
            + output);
      } catch (UnsupportedEncodingException e) {
        e.printStackTrace();
      }
    }

  }

}
```

2.2 Scenario 1 - Setup and Run

Requirements:

1. Docker
2. ProstgreSQL Docker Container
3. Zookeeper
4. Kafka
5. Maven
6. Producer Java app
7. Consumer Java app

---

1. Install "Docker" https://docs.docker.com/get-docker/
2. Download "Postgresql" docker container with following terminal command

```
$ docker pull postgres
```

PostgreSQL configuration: Run following commands in Terminal

```
$ docker run --name postgres1 -p 5432:5432 -e POSTGRES_PASSWORD=123 -d
postgres

$ docker ps

$ docker exec -it postgres1 bash

$ su postgres

$ psql

$ DROP TABLE IF EXISTS trades;
$ CREATE TABLE Trade(id serial PRIMARY KEY, tradeId VARCHAR(255), version
integer, counterparty VARCHAR(255), bookid VARCHAR(255),maturityDate DATE,
createddate DATE, expiredFlag VARCHAR(255));
```

3. Zookeeper

Zookeeper located in Kafka folder, installation not required.

4. Kafka

Download https://kafka.apache.org/downloads Kafka and extract files, installation not required.

- Copy following files

```
tradingcorp/resources/kafka/server.properties
tradingcorp/resources/kafka/server-1.properties
tradingcorp/resources/kafka/server-2.properties
```

into `{Kafka Folder}/config/` folder

- run following commands in terminal windows

```
# go into kafka bin directory
cd bin

# run each commands in different terminal window

# Start the ZooKeeper service
$ ./zookeeper-server-start.sh ../config/zookeeper.properties

# Start the Kafka broker service
$ ./kafka-server-start.sh ../config/server.properties

# Start the Kafka broker service
$ ./kafka-server-start.sh ../config/server-1.properties

# Start the Kafka broker service
```

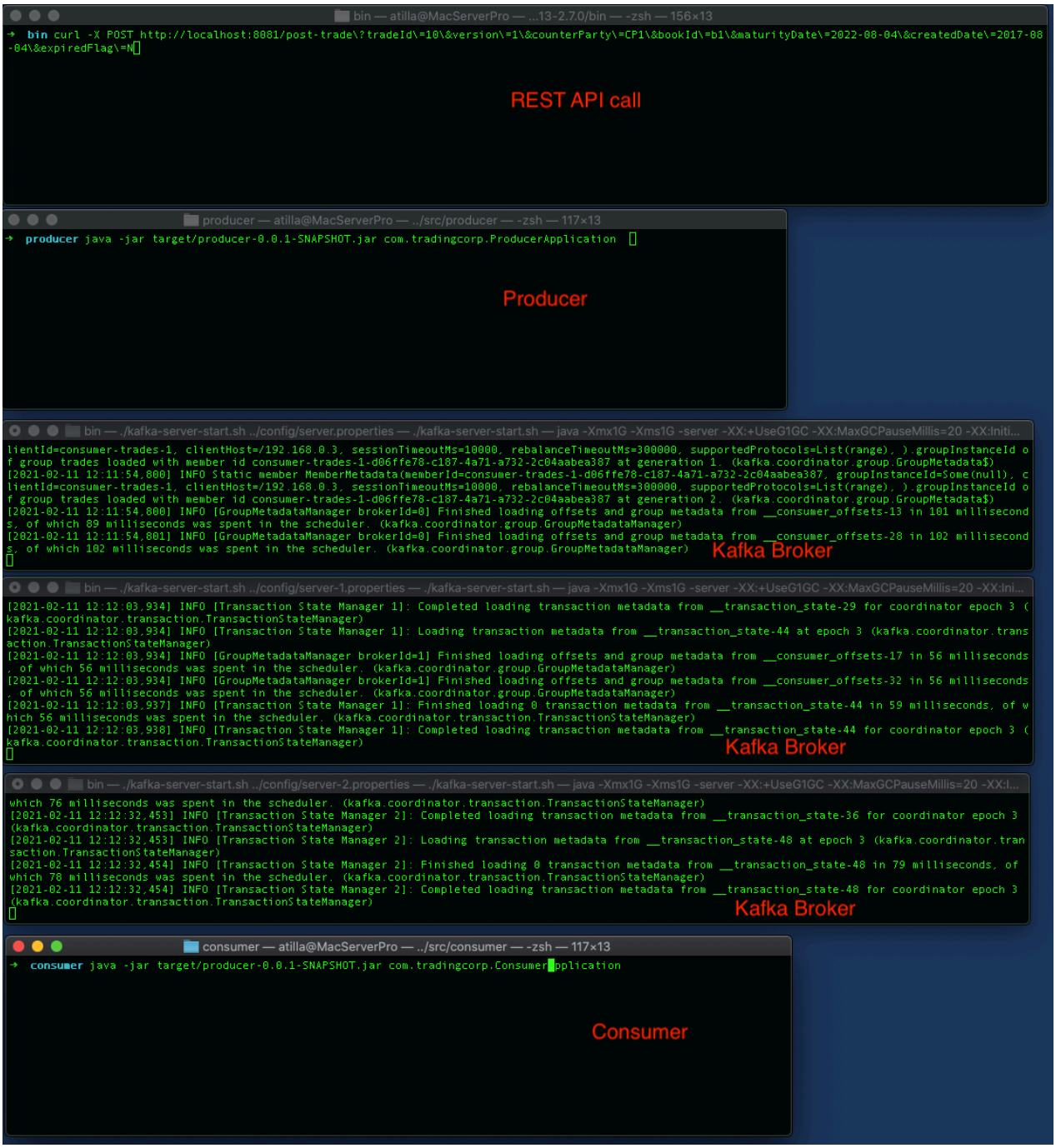
```
$ ./kafka-server-start.sh ../config/server-2.properties

# list topics
$ ./kafka-topics.sh --list --zookeeper localhost:2181
```

5. Install Maven with following guide: https://maven.apache.org/install.html
6. Run following commands in Terminal window

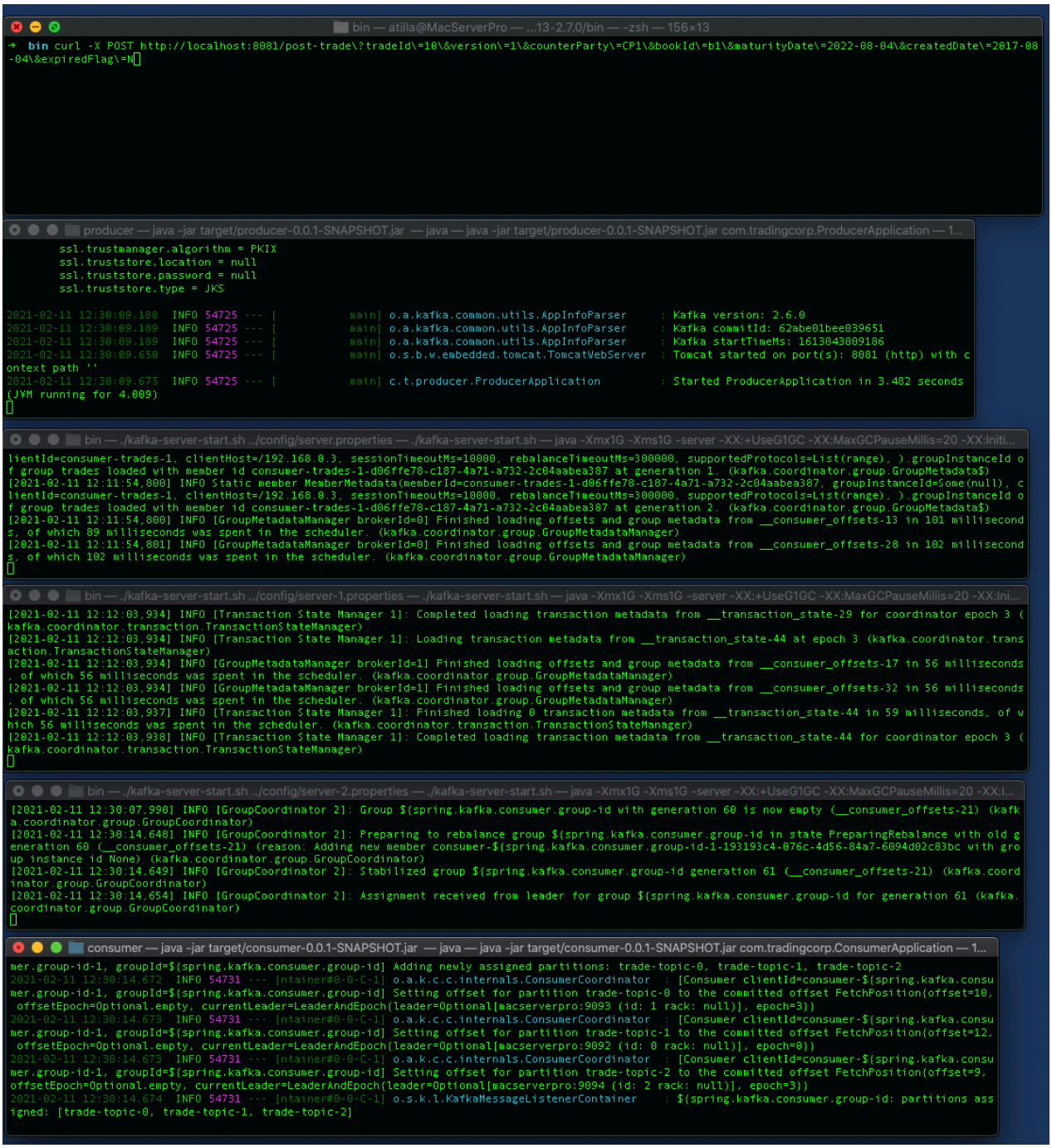
```
$ cd src/producer
$ producer mvn package
$ cd ../consumer
$ mvn package
```

Following picture shows terminal windows

Berore running:



producer and consumer started:



Producer sent message to kafka, Consumer took message and inserted into database:

Database view:

id [INT8]	book_id [	counter_party	created_date [	expired_flag	maturity_date	trade_id [VA	version [INT4]
1	b1	CP1	2017-08-04	N	2022-08-04	10	1
2	b2	CP2	2017-08-04	N	2022-08-04	11	2
3	b3	CP3	2017-08-04	N	2022-08-05	13	3
4	b4	CP4	2017-08-04	N	2022-08-06	14	4
5	b5	CP5	2017-08-04	N	2022-08-06	15	5
<new row>							

2.2.1 Producer Transaction Scenario

1. **Sending Invalid data:** Validation requirement : Store should not allow the trade which has less maturity date then today date. We will check maturity date

- REST API call: `maturityDate=2012-08-04`

```
$ curl -X POST http://localhost:8081/post-trade\?
tradeId\=10\&version\=1\&counterParty\=CP1\&bookId\=b1\&maturityDate\=2012-08-
04\&createdDate\=2017-08-04\&expiredFlag\=N
```

above maturity date is not valid, it is less then today: `maturityDate=2012-08-04`

```
@RestController
public class TradeController {

//....

// Validation applied
if (tradeService.isValid(trade)) {
  logger.info("Trade is VALID trade:" + trade.toString());
  this.tradeService.sendMessageWithCallBack(trade);
} else {
// look for TradeControllerAdvice
  logger.error("ERROR tradeid:" + trade.getTradeId()
      + " Store should not allow the trade which has less maturity date then
today date");
  throw new InvalidTradeException("ERROR tradeid:" + trade.getTradeId()
      + " Store should not allow the trade which has less maturity date then
today date");
}

//...
}
```

- Result: Producer console output

```
$  RESTful request -> Trade [id=null, tradeId=10, version=1, counterParty=CP1,
bookId=b1, maturityDate=2012-08-04, expiredFlag=N]
$  ERROR tradeid:10 Store should not allow the trade which has less maturity
date then today date
```

2. **Sending Valid data:**

- REST API call: `maturityDate=2022-08-04`

```
$ curl -X POST http://localhost:8081/post-trade\?
tradeId\=10\&version\=1\&counterParty\=CP1\&bookId\=b1\&maturityDate\=2022-08-
04\&createdDate\=2017-08-04\&expiredFlag\=N
```

- Result: Producer console output

```
$ Kafka sent: Trade [id=null, tradeId=10, version=1, counterParty=CP1,
bookId=b1, maturityDate=2022-08-04, expiredFlag=N] with offset: 8
```

2.2.2 Consumer Transaction Scenario

1. **Sending Invalid data:** Validation requirement : We will not insert data to database if `expiredFlag=Y` We will check expiredFlag

- REST API call: `expiredFlag=Y`

```
$ curl -X POST http://localhost:8081/post-trade\?
tradeId\=10\&version\=1\&counterParty\=CP1\&bookId\=b1\&maturityDate\=2022-08-
04\&createdDate\=2017-08-04\&expiredFlag\=Y
```

```
@Service
@Transactional
public class TradeConsumerServiceImpl implements TradeConsumerService {
//....
  @Transactional(rollbackFor = InvalidTradeException.class)
  @KafkaListener(topics = "${trade.topic.name}", groupId =
"${spring.kafka.consumer.group-id", containerFactory =
"kafkaListenerContainerFactory")
  @Override
  public void consume(Trade trade) throws InvalidTradeException {

    logger.info(String.format("Trade consume -> %s", trade));

    // Validation
    if (!isValid(trade)) {
      // KafkaConsumerConfig has custom ErrorHandler which is
"TradeErrorHandler"
      // in case of InvalidTradeException
      // TradeErrorHandler will put it into "trade.topic.name.dlt"
      throw new InvalidTradeException("Store should not allow the trade which
has expiredFlag=Y");
    }

    try {

      // Save Trade
      this.saveTrade(trade);
      logger.info(String.format("Trade inserted -> %s", trade));

    } catch (Exception e) {
      logger.error(String.format("Trade insert error -> %s", trade) +
e.getMessage(), e);
      // KafkaConsumerConfig has custom ErrorHandler which is
"TradeErrorHandler"
      // in case of InvalidTradeException
      // TradeErrorHandler will put it into "trade.topic.name.dlt"
      throw new InvalidTradeException(e.getMessage());
```

```
    }
  }


  @KafkaListener(groupId = "${trade.topic.name.dlt.group}", topics =
"${trade.topic.name.dlt}", containerFactory = "kafkaListenerContainerFactory")
  @Override
  public void dltListen(ConsumerRecord<?, ?> consumerRecord) {

    // We consume invalid Trade
    // We can trigger here Roll-back operations
    logger.info("Received Invalid Trade from DLT: " + consumerRecord.value());

    Header originalTopic =
consumerRecord.headers().lastHeader(HEADER_KEY_ORIGINAL_TOPIC);

    if (originalTopic != null) {
      String originalTopicName = new String(originalTopic.value(),
StandardCharsets.UTF_8);
      logger.info("Received Invalid Trade original topic: " +
originalTopicName);
    }

    Header retryCount =
consumerRecord.headers().lastHeader(HEADER_KEY_RETRY_COUNT);

    if (retryCount != null) {
      String count = new String(retryCount.value(), StandardCharsets.UTF_8);
      logger.info("Received Invalid Trade Retry count: " + count);
    }

  }

private boolean isValid(Trade trade) {

  // We can add here all validations

  if (trade.getExpiredFlag().equals("N")) {
    return true;
  }
//...
}
```

- Result: Consumer console output

```
$ Trade consume -> Trade [id=null, tradeId=10, version=1, counterParty=CP1,
bookId=b1, maturityDate=2022-08-04, expiredFlag=Y]
$ ## DTL Trade sent -> Trade [id=null, tradeId=10, version=1,
counterParty=CP1, bookId=b1, maturityDate=2022-08-04, expiredFlag=Y]
$ Received Invalid Trade from DLT: Trade [id=null, tradeId=10, version=1,
counterParty=CP1, bookId=b1, maturityDate=2022-08-04, expiredFlag=Y]
```

2. **Sending Valid data:**

- REST API call: `expiredFlag=N`

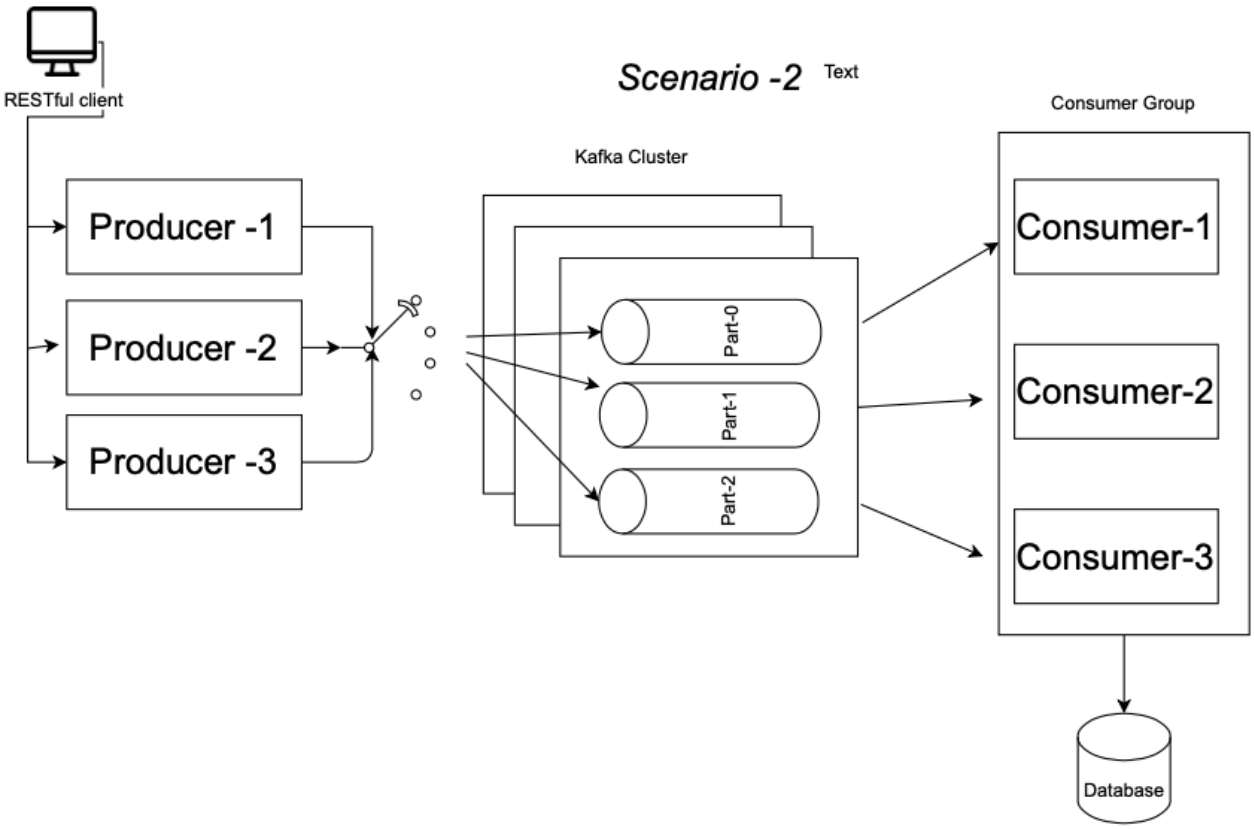
```
$ curl -X POST http://localhost:8081/post-trade\?
tradeId\=10\&version\=1\&counterParty\=CP1\&bookId\=b1\&maturityDate\=2022-08-
04\&createdDate\=2017-08-04\&expiredFlag\=N
```

- Result: Consumer console output

```
.t.c.service.TradeConsumerServiceImpl    : Trade consume -> Trade [id=null,
tradeId=10, version=1, counterParty=CP1, bookId=b1, maturityDate=2022-08-04,
expiredFlag=N]
Hibernate:
    select
        nextval ('trades_id_seq')
Hibernate:
    select
        nextval ('trades_id_seq')
.t.c.service.TradeConsumerServiceImpl    : Trade inserted to databse -> Trade
[id=1, tradeId=10, version=1, counterParty=CP1, bookId=b1, maturityDate=2022-
08-04, expiredFlag=N]
.t.c.service.TradeConsumerServiceImpl    : Trade inserted -> Trade [id=1,
tradeId=10, version=1, counterParty=CP1, bookId=b1, maturityDate=2022-08-04,
expiredFlag=N]
Hibernate:
    insert
    into
        trade
        (book_id, counter_party, created_date, expired_flag, maturity_date,
trade_id, version, id)
    values
        (?, ?, ?, ?, ?, ?, ?, ?)
```

3. Scenario 2

We have 3 "producer" and 3 "consumer". They communicate using 3 Kafka Broker, 3 Partition



Requirements:

1. Run 3 instance of "Producer" application
2. We will add 2 more consumer into "Consumer" application. All 3 Consumers will use same "group-id"

---

1. We will modify `application.properties' for additional copies like below.

src > producer > src > main > resources > application.properties

```
server.port=8081
spring.kafka.producer.bootstrap-servers: localhost:9092, localhost:9093, localhost:9094
spring.kafka.producer.key-serializer: org.apache.kafka.common.serialization.StringSerializer
spring.kafka.producer.value-serializer: org.springframework.kafka.support.serializer.JsonSerializer

trade.topic.name: trade-topic
trade.topic.partition.count: 3
# We will set different hashkey for different producer instances
trade.topic.producer.target.partition.hashkey: P1


```

application.properties ×

src > producer-2 > src > main > resources > application.properties

```
server.port=8082
spring.kafka.producer.bootstrap-servers: localhost:9092, localhost:9093, localhost:9094
spring.kafka.producer.key-serializer: org.apache.kafka.common.serialization.StringSerializer
spring.kafka.producer.value-serializer: org.springframework.kafka.support.serializer.JsonSerializer

trade.topic.name: trade-topic
trade.topic.partition.count: 3
# We will set different hashkey for different producer instances
trade.topic.producer.target.partition.hashkey: P2


```

application.properties ×

src > producer-1 > src > main > resources > application.properties

```
server.port=8083
spring.kafka.producer.bootstrap-servers: localhost:9092, localhost:9093, localhost:9094
spring.kafka.producer.key-serializer: org.apache.kafka.common.serialization.StringSerializer
spring.kafka.producer.value-serializer: org.springframework.kafka.support.serializer.JsonSerializer

trade.topic.name: trade-topic
trade.topic.partition.count: 3
# We will set different hashkey for different producer instances
trade.topic.producer.target.partition.hashkey: P3


```