**Kafka**

**Duration:** 10 days (2hrs/day)

**Course Content:**

**Day 1: Introduction to Apache Kafka and Microservices**

- Overview of Microservices Architecture

- Understanding the principles of microservices

- Benefits and challenges

- Overview of Kafka

- Introduction to distributed messaging systems

- Kafka architecture and components

- Installing Kafka on Windows

- Step-by-step guide to installing Kafka and ZooKeeper

- Configuring environment variables

- \*\*Hands-On:\*\*

- Setting up a single-node Kafka cluster

- Creating a simple Kafka topic

**Day 2: Kafka Fundamentals**

- Kafka Topics and Partitions

- Understanding topics and partitions

- Creating and managing topics

- Producers and Consumers

- Writing a simple Kafka producer and consumer

- Hands-on exercise with basic producer-consumer interactions

- \*\*Hands-On:\*\*

- Producing and consuming messages

- Exploring topic configurations

**Day 3: Kafka Architecture Deep Dive**

- Kafka Brokers and ZooKeeper

- Detailed look at Kafka brokers and their interactions with ZooKeeper

- Configuring ZooKeeper for Kafka

- Multi-node Kafka Cluster Setup

- Setting up a multi-node Kafka cluster on a single Windows system

- Testing the cluster setup

- \*\*Hands-On:\*\*

- Configuring multi-node Kafka cluster

- Verifying cluster functionality

**Day 4: Kafka Integration with Spring Boot (Producer)**

- Introduction to Spring Boot

- Overview of Spring Boot features and advantages

- Kafka Producer with Spring Boot

- Creating a Spring Boot application as a Kafka producer

- Sending messages to Kafka topics using Spring Kafka

- \*\*Hands-On:\*\*

- Developing a Spring Boot Kafka producer application

- Sending messages from Spring Boot to Kafka

**Day 5: Kafka Integration with Spring Boot (Consumer)**

- Kafka Consumer with Spring Boot

- Creating a Spring Boot application as a Kafka consumer

- Receiving and processing messages from Kafka topics using Spring Kafka

- \*\*Hands-On:\*\*

- Developing a Spring Boot Kafka consumer application

- Consuming and processing messages in Spring Boot

**Day 6: Kafka Connect Basics**

- Understanding Kafka Connect for Data Integration

- Overview of Kafka Connect architecture

- Connectors and transformations

- Hands-on with Kafka Connect

- Setting up and configuring connectors for MySQL

- Data import/export between Kafka and MySQL

- \*\*Hands-On:\*\*

- Configuring Kafka Connect for MySQL integration

- Performing data import/export tasks

**Day 7: Microservices Communication with Kafka**

- Microservices Communication Patterns

- Synchronous and asynchronous communication

- Event-driven architecture with Kafka

- \*\*Hands-On:\*\*

- Implementing microservices communication using Kafka

**Day 8: Fault Tolerance and Reliability**

- Kafka Reliability and Replication

- Configuring replication for fault tolerance

- Understanding in-sync replicas (ISRs)

- Handling Failures

- Dealing with node failures and recovery

- Best practices for maintaining high availability

- \*\*Hands-On:\*\*

- Configuring replication in Kafka

- Simulating and recovering from node failures

**Day 9: Advanced Topics: Kafka Streams and Spring Cloud**

- Introduction to Kafka Streams

- Overview of Kafka Streams for stream processing

- Key concepts: Stream, Table, Processor

- Kafka Streams Integration with Spring Cloud

- Building microservices with Kafka Streams and Spring Cloud Stream

- \*\*Hands-On:\*\*

- Implementing a Kafka Streams application with Spring Cloud

**Day 10: Advanced Topics and Integration**

- Kafka Connect Advanced Configurations

- Exploring advanced configurations for Kafka Connect

- Handling schema evolution and compatibility

- Kafka Streams Advanced Concepts

- Delving into advanced Kafka Streams features

- State stores, punctuations, and interactive queries

- Spring Boot and Kafka Streams Integration

- Integrating Spring Boot with Kafka Streams for real-world scenarios

- Building robust and scalable microservices

- \*\*Hands-On:\*\*

- Configuring advanced Kafka Connect scenarios

- Implementing advanced Kafka Streams applications with Spring Boot

- Best Practices and Troubleshooting

- Discussing best practices for Kafka and Spring Boot integration

- Addressing common issues and troubleshooting tips