Advanced Kafka with Microservices

Duration: 5 days

Pre-requisites

Participants joining the program should:

- Have thorough knowledge on fundamentals of programming logic and techniques, basic data structures and algorithms.
- Experience in Programing on Java, Developing Applications using Java is necessary.
- Having knowledge on Database
- Have Working knowledge of Linux Operating System and its CLI commands, working knowledge on Git
- Having hands-on experience of .NET, C# is necessary
- Having hands-on experience of ADO.NET, ASP.NET Core, Web API is necessary
- Be able to communicate and understand spoken and written English.

Day 1

- Creating Kafka Producers
- Serialization, Using serializers for string and JSON messages, Custom serializers for complex data types.
- Asynchronous and Synchronous Messaging
- Ensuring reliable message delivery.
- Creating Kafka Consumers
- Writing consumer code to process messages from topics.
- Deserialization
- Using deserializers for JSON and custom message formats.
- Handling Consumer Offsets

Day 2

- Partitioning and Keyed Messages
- Understanding partitions and their role in scaling.
- Sending keyed messages to control partitioning.
- Error Handling and Retries
- Handling producer and consumer errors.
- Dead-letter topics for unprocessable messages.
- Transactional Messaging
- Ensuring exactly-once semantics in Kafka.
- Implementing transactional producers and consumers.

Day 3

- Introduction to Kafka Streams, Differences between Kafka Streams and traditional messaging.
- Stream Processing with .NET, Implementing stream processing pipelines using Kafka.
- Performing transformations, aggregations, and joins.
- Windowing and Event Time, Implementing windowed operations, Handling late events.
- Overview of Kafka Connect
- Using Kafka Connect for external system integration.
- Popular connectors: JDBC, FileStream, and more.
- Custom Connectors
- Building .NET-based Kafka connectors.
- Writing source and sink connectors.

Day 4

- Building Event-Driven APIs
- Using Kafka in microservices with ASP.NET Core.
- Producing and consuming events in a web application.
- Background Services
- Running Kafka consumers as hosted services in ASP.NET Core.
- Handling message processing in a scalable manner.
- Real-Time Data Pipelines
- Implementing real-time streaming with SignalR and Kafka.

Day 5

- Monitoring Kafka Applications
- Using logging frameworks to monitor Kafka activity in .NET.
- Tools like Prometheus and Grafana for Kafka monitoring.
- Securing Kafka
- Configuring SSL/TLS for encrypted communication.
- Authentication and authorization using SASL.
- Testing and Debugging
- Unit testing Kafka producers and consumers in .NET.
- Simulating Kafka clusters for integration testing.

Program Outcome

Post successful completion of the program, learners will be able to:

- Understand and implementation of Kafka with Messages, Streams
- Implementation of Custom Connectors
- Implementation of Monitoring and managing Kafka, Prometheus and Grafana and Security
- Implementation of ASP.NET Core with Microservices