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Confluent Kafka with .NET

2-day intensive outline

FA-0139 · 2-day

Software Development

Introduction

In today's rapidly evolving technological landscape, the ability to process and analyze vast amounts of data in real-time is crucial for businesses to maintain a competitive edge. This has led to the widespread adoption of event streaming platforms like Apache Kafka. Confluent Kafka, an enterprise version of Apache Kafka, offers enhanced features and capabilities that make it easier to build robust, scalable, and real-time data pipelines.

.NET, a popular framework developed by Microsoft, provides a powerful environment for building a wide range of applications, from web and mobile apps to microservices and cloud-based solutions. Combining the strengths of .NET with Confluent Kafka allows developers to create efficient and scalable real-time data processing applications. This training course aims to equip participants with the knowledge and skills needed to integrate .NET applications with Confluent Kafka, enabling them to build modern, real-time data-driven applications that can handle large volumes of data with ease.

Learning outcomes

By the end of this training course, participants will be able to:

- Understand the basics of event streaming and the role of Kafka in real-time data processing.
- Set up and configure Confluent Kafka for use with .NET applications.
- Develop .NET applications that can produce and consume messages from Kafka topics.
- Implement advanced Kafka features such as stream processing and schema registry.
- Integrate Confluent Kafka with other systems and services.
- Troubleshoot and optimize Kafka-based .NET applications for performance and reliability.

Prerequisites

Participants should have:

- Basic knowledge of .NET and C# programming.
- Understanding of fundamental concepts in distributed systems.
- Familiarity with basic database operations and SQL.
- Some experience with messaging systems or event-driven architectures (preferred but not mandatory).
- Access to a development environment with .NET Core SDK and Visual Studio installed.
- Access to Confluent Cloud or a local Confluent Kafka setup.

Training outline

1. Introduction to Event Streaming and Kafka

1. Overview of event streaming

   Introduction to Apache Kafka

   1. History and evolution
   2. Core concepts: producers, consumers, topics, partitions, brokers

3. Key use cases for Kafka

2. Confluent Kafka

Introduction to Confluent Kafka

1. Differences between Apache Kafka and Confluent Kafka
2. Key features of Confluent Kafka

Setting up Confluent Kafka

1. Confluent Cloud vs. on-premise setup
2. Installing and configuring Confluent Kafka locally

3. .NET and Kafka Integration

1. Introduction to the Confluent .NET Kafka client

   Setting up a .NET project for Kafka integration

   1. Installing necessary NuGet packages
   2. Configuring Kafka client in .NET

4. Producing Messages to Kafka

1. Understanding Kafka producers

   Implementing a basic Kafka producer in .NET

   1. Creating and configuring a producer
   2. Sending messages to Kafka topics
3. Error handling and logging in Kafka producers
4. Optimizing producer performance

5. Consuming Messages from Kafka

1. Understanding Kafka consumers

   Implementing a basic Kafka consumer in .NET

   1. Creating and configuring a consumer
   2. Reading messages from Kafka topics
3. Managing consumer groups and offsets
4. Error handling and logging in Kafka consumers
5. Optimizing consumer performance

6. Advanced Kafka Features

Kafka Streams API

1. Introduction to stream processing
2. Implementing stream processing in .NET
3. Use cases and examples of stream processing

Kafka Schema Registry

1. Introduction to schema management
2. Using Schema Registry with .NET applications
3. Avro serialization and deserialization

7. Integrating Kafka with Other Systems

Connecting Kafka to databases

1. Using Kafka Connect for database integration
2. Example: Integrating Kafka with SQL Server

Integrating Kafka with microservices

1. Event-driven microservices architecture

2. Examples of microservices integration with Kafka

8. Monitoring and Managing Kafka

Monitoring Kafka clusters

1. Tools and techniques for monitoring
2. Key metrics to monitor

Managing Kafka clusters

1. Scaling Kafka clusters
2. Ensuring high availability and fault tolerance
3. **Troubleshooting and Optimizing Kafka Applications**

3. Common issues and solutions in Kafka-based applications
4. Performance tuning for Kafka producers and consumers
5. Best practices for building reliable Kafka applications

9. Hands-On Labs and Projects

1. Lab: Setting up Confluent Kafka locally
2. Lab: Building a .NET Kafka producer and consumer
3. Project: Implementing a real-time data pipeline with Kafka and .NET
4. Project: Stream processing with Kafka Streams and .NET

This comprehensive training outline will help participants gain a deep understanding of .NET development using Confluent Kafka, equipping them with the skills needed to build and manage real-time data-driven applications.

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