Kafka Mastery Course with JavaScript and Node.js

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Module 1: Introduction to Kafka

Time: 5 hours

1.1 What is Kafka? (1 hour)

- Overview of Kafka and its use cases.
- Kafka vs. traditional messaging systems (e.g., RabbitMQ, ActiveMQ).
- Real-world applications of Kafka (e.g., real-time analytics, log aggregation).

1.2 Kafka Architecture (1.5 hours)

- Brokers, Topics, Partitions, and Logs.
- Producers, Consumers, and Consumer Groups.
- Kafka Clusters and Replication.

1.3 Kafka Ecosystem (1 hour)

- Kafka Streams, Kafka Connect, Schema Registry, and REST Proxy.
- Overview of Confluent Platform and its tools.

1.4 Setting Up Kafka Locally (1.5 hours)

- Installing Kafka and ZooKeeper.
- Running Kafka using Docker.
- Basic Kafka CLI commands (creating topics, producing/consuming messages).

Module 2: Kafka with Node.js

Time: 7 hours

2.1 Introduction to Node.js and Kafka (1 hour)

- Overview of Node.js and its event-driven architecture.

- Kafka client libraries for Node.js (kafkajs, node-rdkafka).

2.2 Setting Up a Node.js Project (1 hour)

- Initializing a Node.js project.
- Installing and configuring Kafka client libraries.

2.3 Producing Messages (2 hours)

- Connecting to Kafka from Node.js.
- Producing messages to a topic.
- Handling acknowledgments and errors.

2.4 Consuming Messages (2 hours)

- Consuming messages from a topic.
- Handling message offsets and consumer groups.
- Error handling and rebalancing.

2.5 Advanced Producer and Consumer Features (1 hour)

- Message serialization (JSON, Avro, Protobuf).
- Partitioning strategies and custom partitioners.

Module 3: Kafka Streams with Node.js

Time: 8 hours

3.1 Introduction to Kafka Streams (1 hour)

- What are Kafka Streams?
- Use cases for stream processing.

3.2 Setting Up Kafka Streams in Node.js (2 hours)

- Using libraries like kstream or kafkajs for stream processing.
- Creating a stream processing topology.

3.3 Building a Simple Stream Processing Application (3 hours)

- Transforming and aggregating data.
- Windowing and stateful processing.

3.4 Advanced Stream Processing (2 hours)

- Joining streams (KStream-KStream, KStream-KTable).
- Handling late data and out-of-order events.

Module 4: Kafka Connect with Node.js

Time: 6 hours

4.1 Introduction to Kafka Connect (1 hour)

- What is Kafka Connect?
- Source and Sink connectors.

4.2 Building a Custom Kafka Connector in Node.js (3 hours)

- Overview of the Kafka Connect API.
- Creating a source connector.
- Creating a sink connector.

4.3 Deploying and Managing Connectors (2 hours)

- Deploying connectors to a Kafka Connect cluster.
- Monitoring and managing connectors.

Module 5: Kafka Security and Monitoring

Time: 7 hours

5.1 Kafka Security (3 hours)

- SSL/TLS for encryption.
- SASL for authentication.
- ACLs and access control.

5.2 Monitoring Kafka with Node.js (2 hours)

- Monitoring Kafka brokers, topics, and consumers.
- Using tools like Kafka Manager or Confluent Control Center.

5.3 Setting Up Monitoring Alerts (2 hours)

- Configuring alerts for Kafka metrics.
- Integrating with monitoring tools like Prometheus and Grafana.

Module 6: Capstone Project - Real-Time Streaming Application

Time: 8 hours

6.1 Project Overview (1 hour)

- Defining project requirements and architecture.

6.2 Implementing the Producer (2 hours)

- Generating and producing real-time data to Kafka topics.

6.3 Implementing the Consumer (2 hours)

- Consuming and processing data from Kafka topics.

6.4 Implementing Stream Processing (2 hours)

- Using Kafka Streams for data transformation and aggregation.

6.5 Deploying and Testing the Application (1 hour)

- Deploying the application and testing its performance.

Module 7: Final Project and Course Wrap-Up

Time: 3 hours

7.1 Final Project (2 hours)

- Building and presenting a Kafka-based application.

7.2 Course Review and Next Steps (1 hour)

- Review of key concepts.
- Resources for further learning.

Module 8: Kafka Infrastructure Setup and Administration

Time: 8 hours

8.1 Capacity Planning (2 hours)

- Estimating resource requirements for Kafka clusters.

8.2 Installation and Configuration (3 hours)

- Installing and configuring Kafka and ZooKeeper.
- Setting up a multi-broker Kafka cluster.

8.3 Disaster Recovery Planning (3 hours)

- Backup and recovery strategies.
- Failover mechanisms and testing.

Module 9: Kafka Security and Compliance

Time: 6 hours

9.1 Advanced Security Practices (3 hours)

- Auditing and logging mechanisms.
- Securing Kafka in production environments.

9.2 Compliance with Regulations (3 hours)

- Ensuring compliance with GDPR and other regulations.

Module 10: Performance Optimization and Tuning

Time: 7 hours

10.1 Optimizing Partitions and Brokers (3 hours)

- Partitioning strategies and tuning.

10.2 Tuning Producers, Brokers, and Consumers (4 hours)

- Configuring for high throughput and low latency.

Module 11: Kafka Connect and Integration with External Systems

Time: 6 hours

11.1 Configuring Self-Managed Connectors (3 hours)

- Building and deploying custom connectors.

11.2 Integration with External Systems (3 hours)

- Integrating Kafka with databases, data lakes, and other systems.

Module 12: Architecture Design and Best Practices

Time: 5 hours

12.1 Designing Scalable Architectures (3 hours)

- Best practices for Kafka architecture design.

12.2 Developing Frameworks and Standards (2 hours)

- Creating reusable components and standards.

Module 13: Operational Excellence and Advanced Topics

Time: 7 hours

13.1 High Availability and Redundancy (2 hours)

- Ensuring high availability in Kafka clusters.

13.2 Tooling and Automation (2 hours)

- Automating Kafka deployment and management.

13.3 Documentation and Performance Testing (3 hours)

- Writing documentation and conducting performance tests.

Additional Time for Breaks and Reviews

Time: 10 hours

- Purpose: To ensure thorough understanding and retention.

Total Estimated Time: 86 hours