**Eclipse Vert.x \_Agenda**

**(Building Reactive Applications on the JVM)**

**Duration:20 Hours**

**Module 1: Fundamentals of Asynchronous Programming with Vert.x (8 Hours)**

1. **Introduction to Vert.x, Asynchronous Programming, and Reactive Systems** (1.5 Hours)
   * Overview of Vert.x toolkit and ecosystem.
   * Importance of asynchronous and non-blocking programming.
   * Characteristics of reactive systems.
   * Comparison with other toolkits (Akka, RxJava).
2. **Verticles: Core Processing Units in Vert.x** (2.5 Hours)
   * What are verticles? Writing, configuring, and deploying.
   * Understanding the Vert.x threading model and event loop.
   * Best practices for mixing Vert.x and non-Vert.x threads.
3. **The Event Bus: The Backbone of Vert.x Applications** (2 Hours)
   * Introduction to the event bus: features and architecture.
   * Communication patterns: point-to-point, request-reply, publish-subscribe.
   * Distributed event bus for cross-network communication.
4. **Advanced Asynchronous Techniques** (2 Hours)
   * Moving beyond callbacks: using Futures, Promises, and composing operations.
   * RxJava with Vert.x: handling streams of asynchronous events.
   * Error handling and retry strategies in asynchronous flows.
   * Optimizing throughput with backpressure and stream buffering.

**Module 2: Building Reactive Applications with Vert.x (7 Hours)**

1. **Messaging and Event Streaming** (3 Hours)
   * Event streaming with Apache Kafka and Vert.x.
   * Integrating messaging protocols like AMQP and MQTT.
   * Handling retries, deduplication, and at-least-once message processing.
   * Advanced use cases: integrating Kafka Streams with Vert.x.
2. **Database Integration**(4 Hours) bulk
   * PostgreSQL and MongoDB integration.
   * What the Eclipse Vert.x stack provides
   * Product service with MongoDB
   * Data model
   * Product profile API verticle and initialization
   * Validating product input
   * Fetching a product’s data
   * Updating a product’s data
   * Product service with PostgreSQL
   * Data model
   * Opening a connection pool
   * Inserting a new record
   * Advanced database handling: transactions and connection pooling.

**Module 3: Building Reactive Rest API &Microservices Using Vert.x & Micronaut (5 Hours)**

1. **Vert.x REST API** (3 Hours)
   * Vert.x Web Application
   * Http Routing - GET request
   * Custom Object - Error handling
   * Http Routing - Path Variables
   * In Memory Store
   * Custom HttpResponse
   * HTTP Routing - PUT
   * Body Handler
   * HTTP Routing - DELETE
   * HTTP Headers - Content Type
   * Refactor HTTP Handlers
2. **Vert.x with Quarkus: Cloud-Native Microservices** (2 Hours)
   * Enhancing Vert.x with Quarkus for native image compilation.
   * Hot reloading and lightweight deployment.
   * Setup a Quarkus Project
   * Quarkus Reactive - Inject Vert.x
   * Quarkus Reactive - Vert.x EventBus