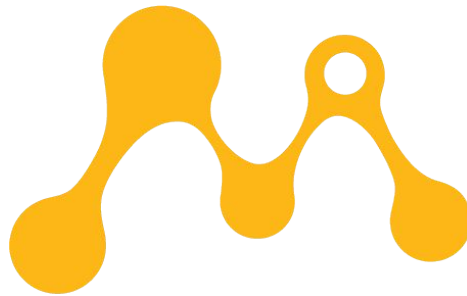# Official MicroProfile Tutorial

Who is this Tutorial for

Software professionals at **all levels** including beginners with less experience, senior developers, engineering managers and architects.

Hands-on project

An online store or an ecommerce application example would be used to demonstrate development of microservices using the MicroProfile APIs to make this tutorial more **engaging** and **relevant** for **real-world projects**.

What will be covered

It will first start with an overview of the MicroProfile project, followed by detailed sections on each specification with thoroughly tested and updated **code samples**.

Chapter 1: Introduction to MicroProfile

This chapter will provide a comprehensive overview of the MicroProfile platform to ensure a deep understanding of its architecture, specifications, and key features.It provides a solid foundation for understanding the MicroProfile platform, its purpose, and its place in the broader context of Java enterprise development. It covers its benefits, its relationship with Jakarta EE, and how it supports cloud-native application development.

Topics to be covered:

- What is MicroProfile (Brief introduction)
- Need for MicroProfile (How it addresses the needs for microservices development)
- Benefits of MicroProfile (This section would focus on advantages of using
- MicroProfile, vendor-neutrality and standardization)
- Relationship with Jakarta EE specification (How MicroProfile complements Jakarta EE, and focuses on integration and interoperability.
- Cloud-Native Development with MicroProfile (characteristics of cloud-native
- application, how microprofile facilitates cloud-native development)

Chapter 2: Getting Started

This chapter will guide you through the initial steps of setting up your development environment and creating a simple MicroProfile-based microservices application.It covers setting up your development environment, creating a simple microservice, deploying it, and interacting with it.

Topics to be covered:

- Development Environment Setup
- Configuring Build Tools
- Initializing a new MicroProfile Project
- Choosing right modules for your application
- Building a Simple Microservice
- Deployment the microservices
- Testing your microservices

Chapter 3: REST Client

This chapter provides a comprehensive understanding of the MicroProfile REST Client specification. It covers the basics of setting up and configuring the REST client, creating interfaces, handling requests and responses, and implementing error handling.

Topics to be covered:

- Overview of the REST Client Specification
- Setting up dependencies for REST Client
- Creating REST Client Interface
- Handling Requests and Responses
- Configuring Headers, Query and Path Parameters
- Working with various Data formats like JSON or XML
- Error Handling

Chapter 4: MicroProfile Configuration

This chapter focuses on MicroProfile Configuration, a key feature that allows developers to externalize configuration properties from their code. It provides flexibility and adaptability for microservices in different environments.

Topics to be covered:

- Understanding MicroProfile Configuration
- Defining Configuration Properties
- Working with Various Configuration Sources
- Dynamic Updates and Handling Configuration Change Events
- Securing Configuration
- Managing Configuration for Different Environments
- Integration with external configuration providers
- Handling Missing or Invalid configurations

Chapter 5: MicroProfile Metrics

This chapter provides a deep dive into MicroProfile Metrics, a specification for monitoring microservices. It covers metric types, standard metrics provided by MicroProfile, instrumenting microservices, exposing endpoints, interpreting metric data, and integrating with monitoring solutions.

Topics to be covered:

- Introduction to MicroProfile Metrics
- Standard Metrics
- Metric Types
- Instrumenting Microservices with Metrics
- Exposing Metrics
- Integrating with Monitoring Solutions (e.g. Grafana or Prometheus)
- Aggregation and Reporting
- Setting Thresholds for Metric Values
- Configuring Alerts

Chapter 6: MicroProfile Health Checking

This chapter provides an in-depth exploration of MicroProfile Health Checks, a critical component for ensuring the reliability and availability of microservices. It covers types of health checks, standard health indicators provided by MicroProfile.

Topics to be covered:

- Introduction to MicroProfile Health Checks
- - Types of Health Checks
- - Standard Health Checks
- - Implementing and Exposing Health Checks
- - Logging and Reporting Health Checks
- - Best Practices for Effective Health Checks

Chapter 7: MicroProfile Fault Tolerance

In this section, readers will learn about how to apply MicroProfile Fault Tolerance to their applications, demonstrating how to implement strategies like retries, circuit breakers, timeouts, and fallbacks to enhance the resilience and reliability of services.

Topics to be covered:

- Introduction to Fault Tolerance
- Strategies (Retry, Circuit Breaker, Timeout, Fallback)
- Implementation Retry Policies and Configuration
- Avoiding Cascading Failures
- Configuring Circuit Breaker
- Setting Timeouts
- Implementing Fallback Logic
- Isolating Resources for Fault Tolerance

Chapter 8: MicroProfile OpenTelemetry

This chapter focuses on distributed tracing and observability in microservices architectures. It covers various topics about how to gain insights into the flow of requests and monitor the performance of services.

Topics to be covered:

- Introduction to MicroProfile OpenTelemetry
- Trancing Concepts (Spans, Traces and Context Propagation)
- Instrumenting OpenTelemetry
- Setting up Tracing Providers
- Context Propagation and Correlation
- Analyzing Traces
- Security Considerations for Tracing

Chapter 9: MicroProfile OpenAPI

This chapter focuses on MicroProfile OpenAPI, a powerful tool for defining and documenting APIs in a microservices architecture. It enables developers to create clear and standardized API specifications.

Topics to be covered:

- Introduction to MicroProfile OpenAPI
- API Specification using MicroProfile Open API
- Generating API Documentation
- Managing API Versions and Categories
- Documenting Authentication and Authorization Requirements
- Enabling Interactive API Testing and Exploration using Swagger UI
- Describing Security Schemes and Protocols
- Adding Tags for Improved Documentation Navigation
- Integration with API Gateways and Tools
- Best Practices for Effective API Documentation

Chapter 10: JWT Authentication

This chapter focuses on JSON Web Token (JWT) Authentication in the context of MicroProfile, providing a secure and efficient method for authenticating and authorizing users in microservices architectures. It covers JWT basics, user authentication, claims, scopes, token expiration, role-based access control, endpoint security, integration with identity providers, token revocation, and best practices.

Topics to be covered:

- Introduction to JWT Authentication
- Understanding JSON Web Tokens
- Request Flow
- Obtaining and Validating JWT Tokens
- Defining User Claims and Scopes in JWT
- Role-Based Access Control (RBAC)
- Setting Token Expiry Times for Security
- Implementing Token Refresh for Long-Lived Sessions
- Integration with Identity Providers (e.g. OAuth, OpenID)
- Security Considerations
- Best Practices for JWT Authentication

Chapter 11: Jakarta EE 10 Core Profile

This chapter delves into the Jakarta EE 10 Core Profile, which forms the foundational framework for building enterprise-grade applications in the Java ecosystem. It covers the essential components and features provided by Jakarta EE.

Topics to be covered:

- Introduction to Jakarta EE 10 Core Profile
- Key Specifications in Core Profile (Jakarta Annotations, CDI, Interceptors,
- JSON-P, JSON-B, Restful Web Services)
- Managing Component Dependencies
- Handling HTTP Methods and Resources
- Best Practices for Building Robust and Scalable Applications