# Spring Boot with Microservices, Docker and Kubernetes – Course Outline

## 1    Duration

- 5 days

## 2    Objectives

At end of this workshop, participants will able to :

- Get detail understanding of Spring Boot fundamentals, architecture, features and usage
- Understand how to create Spring Boot project, build and deploy to production
- Get overall understanding of Microservices concepts, architecture and patterns
- Understand Spring Cloud services - Service Registry, Discovery, API Gateway, Circuit Breakers
- Get understanding of Docker and Kubernetes fundamentals, architecture, features and usage
- Design and develop web applications / services using Spring Boot and deploy as Docker containers

*Note: This course is designed for beginner to intermediate level.*

## 3    Audience

Developers who are interested to learn and build standalone scalable web apps/APIs with Spring Boot and deploy as micro services with Docker and Kubernetes

## 4    Pre-requisite

- Good knowledge on Java programming
- Knowledge on Spring Framework
- Familiarity on Maven build tool and XML/JSON

## 5    Hardware & Network Requirements

- Desktop/Laptop with minimum 8GB RAM
- Open Internet connection (minimum 1 Mbps per user)

## 6    Software Requirements

- Windows / Linux OS
- Oracle VirtualBox

* Pre-configured image with all required softwares to be shared along with setup instructions before the training for labs.

# 7   Outline

## Day 1

### Module-1: Introduction to Spring Boot

- Spring Framework Overview
- Spring Boot Overview
- Installation and Configuration
- Spring Boot CLI
- Integration with IDE

### Module-2: Create Spring Boot Application

- Create Spring Boot Project
  - Spring Maven Project
  - Spring Starter Project
  - Spring Initializr
  - Spring Boot CLI
- Spring Boot Sample Application

### Module-3: Spring Boot Internals and Features

- Configuration
- Auto-Configuration
- @SpringBootApplication Annotation
- Externalized Configuration
- Profiles
- Logging
- Packaging

## Day 2

### Module-4: Spring Boot Web Development and REST API

- Spring MVC / REST Overview
- Spring Boot support for Spring MVC
- Spring Boot support for Spring REST
- Embedded web container support
- Sample web application using Spring Boot

## Module-5: Data Access with Spring Boot

- Spring Boot support for SQL Databases
  - JdbcTemplate
  - JPA
- Spring Boot support for NoSQL Technologies
  - Spring Data
  - MongoDB
- Embedded Database Support
- Sample web application with data access using Spring Boot

## Module-6: Monitoring and Management

- Actuator Overview
- Endpoints
- Remote Shell
- Metrics
- Auditing and Tracing
- Developer Tools

## Day 3

## Module-7: Introduction to Microservices

- Architectural Styles Overview
- Monolith Architecture
- Service Oriented Architecture (SOA)
- Distributed Architecture
- Microservice Based Architecture (MSA)
- Compare and contrast different architectural styles
- Microservice characteristics
- Microservice Concepts Overview
- Benefits and limitations
- Microservice Reference Architecture

## Module-8: Introduction to Microservices Patterns and Spring Cloud

- Microservices Patterns Overview
- Centralized and versioned Configuration Management with Spring Cloud Config
- Dynamic Configuration updates with Spring Cloud Bus
- Service Discovery with Spring Cloud Netflix Eureka
- Working with API Gateway - Spring Cloud Netflix Zuul
- Applying circuit breakers with Spring Cloud Netflix Hystrix
- Declarative REST clients with Spring Cloud Netflix Feign
- Sample Microservices based application applying above concepts

## Day 4

### Module-9: Docker Overview

- Introduction to Docker
- Docker Architecture
- Virtual Machines vs Containers
- Docker Setup and Configuration
- Components
  - Docker Engine
  - Docker Registry
  - Docker Compose
  - Docker File
  - Images
- Managing Container Linking, Storage, Networking and Logging
- Create Docker File for Spring Boot application
- Build Docker image
- Deployment workflow
- Docker Automation with Continuous Integration
- Hands-on exercise to package spring boot applications into Docker images and deploy

## Day 5

### Module-10: Kubernetes Overview

- Introduction to Kubernetes
- Kubernetes Architecture
- Kubernetes Setup and Configuration
- Kubernetes Components - Node, Service, Pod
- Understand Kubernetes Job, Replication, Deployments, Volumes, Secrets, Network Policies
- Creating and deploying an application in Kubernetes with Docker
- Configure Auto Scaling and High Availability
- Managing and accessing Kubernetes cluster with API and Kubectl
- Kubernetes Monitoring with Dashboard