Introduction to Spring Framework5.3 and Spring Boot MicroServices

The **Spring Framework** is the application framework for the Java platform. The framework's core features can be used by any Java applications.
Spring Boot is a higher level spring framework which simplifies build and deployments of spring based applications.
Spring Boot supports creating standalone Spring applications that run with an embedded instance of Tomcat, Jetty, etc. and as well as packaged deployments like jar or war files.
These Spring Boot applications feature integrated health monitoring, documentation, simplified Maven configuration, and a host of other features that make building, deploying, and running the Spring applications far easier.
Spring Boot also supports Spring Data, web, services, JDBC, Integration and security flavors to Spring application with minimum programming and configuration.

Spring Cloud supports tools to quickly build common services needed in distributed systems e.g. configuration management, service discovery, circuit breakers, intelligent routing, micro-proxy, control bus, one-time tokens, global locks, leadership election, distributed sessions, cluster state etc.

Course Objectives
To impart practical training to the software developers on

1. Spring5.3.x framework features usage for java applications
2. Spring5.3.x framework in web applications
3. Spring5.3.x framework for MicroServices development
4. Spring Boot framework for MicroServices development and deployment with Spring framework.
5. An overview introduction to Docker and Kubernetes.

Prerequisites
The participants should be skilled in JavaEE web applications and aware about web services and REST API implementations.

Target audience
Maximum 20 participants who want to understand and learn to apply the Spring5.3.x and Spring Boot in MicroServices applications in docker and Kubernetes environment.

Training Methodology
The theoretical topics are discussed interactively and technical details are demonstrated with practical examples. The participants work on the hands on exercises which strengthen the concepts learned.

Each topic is supplemented with practical demonstrations and exercises for the participants.

Setup
Intel quad/dual core compatible CPU with minimum 16GB RAM and 500GB HDD with Windows 10 OR Ubuntu Linux 18.04 64 bit, Google Chrome, Mozilla Firefox latest browsers,JDK1.8 64 bit, Spring Framework 5.3.1 with dependencies, Apache maven3.6,Spring Tool Suite 3.9, MySql 5 RDBMS Server and Client , Adobe Acrobat Reader latest, Docker for Desktop (Windows), Docker(Ubuntu Linux) should be installed on each participant machine.

Live internet connection with reasonable speed and download permissions is required to download the dependencies and plug-ins.
The participants must have admin rights on their machines.

Course duration: 5 days.

Instructor : Prakash Badhe

Course Outline

Spring Framework

Day1
Spring Framework overview

- Applications, libraries, Framework, and components
- Why Spring?
- Spring Architecture
- Spring features for java EE applications

Dependency Injection with Spring

- Dependency Injection concepts
- IoC as Dependency Injection Container
- Delegating component creation to the Spring bean factory
- Spring Bean Dependency with setter methods, constructors and methods implementations
- Injecting dependencies with xml configurations
- Dependency with annotations in Spring

- Manage Scope(Singleton/Prototype),
- Manage Life Cycle of bean objects.
- Auto wiring and dependency checks.

Aspect Oriented Programming with Spring

- Aspect Oriented Programming overview
- AOP terminologies concerns, aspects, advices, pointCut etc.
- AOP in Java EE applications as filters, exception handling etc.
- Method Interceptors
- Spring AOP containers
- Advices,PointCuts,Joins and Advisors
- Spring AOP Advice interfaces and implementations
- The AOP configuration with Annotations and XML
- Combine Joins and PointCuts declaratively and programmatically.
- AOP in transaction management.

Hands on session

- Set up Spring libraries and creating applications with Spring
- Define pojo application classes with dependencies and wire them through Spring Framework.
- Use bean factory and ApplicationContext objects
- Explore with auto wiring and scope of bean objects
- Lab: Specify Life cycle methods, scope and dependency checks with Auto wiring modes
- Use Spring AOP in java applications
- Explore point-cuts and their behavior
- Define cross-cutting concerns and apply them declaratively with spring applications

Day2

Spring Data access

- Simplify data access with JDBC template
- Streamline code with JDBC templates
- Configure and use JDBC data sources
- The Spring DAO support
- Maintain a consistent data interface for jdbc applications
- Handle data exceptions
- Integrate Spring DAO implementations

Spring Hibernate support

- Hibernate ORM Framework introduction
- Configure Hibernate with data access
- Spring ORM Support.
- Data Access Object (DAO) pattern with Hibernate
- Simplified Hibernate application development with Spring
- Using HibernateTemplate and HibernateDAOSupport

Hands on session

- Use Spring JDBCTemplate in java application to connect to DB and process database results
- Use spring with Hibernate to map the objects to database and define custom processing of data results with xml and annotations.

Day3

MVC Web Applications with Spring

- MVC Architecture
- Separation of implementations
- Spring Web MVC architecture and components
- FrontController with DispatcherServlet

- Define actions with Controller
- ApplicationContext and mappings with xml
- Implement the controller action methods
- ModelAndView object to View page controller
- Dependencies to the front controller
- Dependencies to the action controller
- View components
- Mapping the components
- View Resolvers
- Internationalization
- Different type of controllers
- Controller with annotations
- Combine IoC, AoP and ORM Hibernate support in web application with Spring
- Use of RestController
- Spring MVC web application in Servlet3.x container

Hands on session on web applications

- Define java web application to use spring MVC and validation support.
- Define the web application to integrate with local localization.
- Design spring web application to integrate with Hibernate
- Define REST service with RestController

Day4

Spring Transaction Support

- Managing Transactions
  - Analyzing J2EE transaction support
  - Defining transaction properties
  - Transaction boundaries
- Applying Spring transaction strategies
  - Controlling transactions with the Spring TransactionTemplate
  - Declaring transaction policies with XML
  - declarative transactions)
- Using transaction support in Global distributed environment.

Spring Boot and Micro-Service Applications

SOA Services and Micro-Services

- SOA architecture for service applications
- Web services SOAP and REST
- Monolithic and MicroService architecture

- Benefits of MicroServices
- Convert the Monolithic Services to MicroServices
- Micro-services frameworks and applications
- Implement REST Micro services with Spring Framework

Spring Boot Framework

- Spring Boot high level features
- The Spring Boot CLI
- Spring Boot Starter application with the Spring Initializr
- Spring boot conventions
- Application configuration with application properties
- Build with Maven
- Create, run, test and deploy web application

Spring Boot applications

- Standalone application with Spring Boot
- Build as a Runnable JAR
- Create web application with Spring Boot
- Package and deploy a web application
- Consume the MicroService from clients

Hands on session with Spring boot

- Define web application with spring MVC and validation support.
- Design spring web application to integrate with Hibernate

Day5

Spring JPA Applications

- JPA and ORM
- Spring Data JPA
- Manage JPA Data access application with Spring Boot.

MicroServices Deployments with Spring Cloud components

- API Documentation (Swagger)
- Health monitoring end points with Actuator
- Service aggregation and splitting
- Service Discovery
- Gateway and Config Service

- Message Broker and Asynchronous process
- Event Sourcing & CQRS (Kafka / RabbitMQ)
- Distributed Logging (ELK)
- Circuit Breaker (Hystrix)

Hands on session with Spring boot

- Define miosroservice application with spring boot with crud methods
- Design spring boot web application to integrate with Spring Data and MySqL

Introduction to Docker and Kubernetes

- What is container
- What is docker
- Docker image and containers
- Docker container orchestration management with Kubernetes

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