MicroServ

Microservices

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MicroServ - Version: 1

🕐 5 days Course

Description:

A very important part of modern software development is the new discipline of Cloud-enabled microservices, and part of this is PAAS (Platform as a Service) which allows deploying such apps into production with the minimum effort. This course will introduce the participants into microservices and to its implementation with various frameworks

Intended audience:

Developers, architects

Prerequisites:

Comfortable with command-line operations Familiar with software development

Objectives:

Understand modern software development for stable fault-tolerant and scalable applications using microservices Understand the role of PAAS and PCF Being able to develop microservices and deploy it with PCF
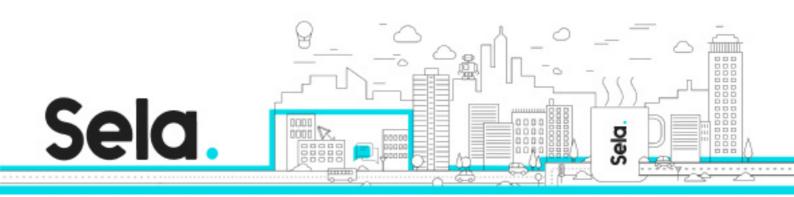
Topics:

Course Intro

- PAAS - Platform as a Service
- Monoliths versus Microservices
- Microservices History
- Pivotal Cloud Foundry

Microservice Fundamentals

- What is a Microservice Architecture
- What is a Microservice
- Benefits of Microservices
- Downsides of Microservices
- Use Cases for Microservices
- Monolithic Architecture
- Distributed Architecture
- Service-oriented Architecture
- Microservice and API Ecosystem
- SOA vs. Microservices
- Microservice & API

Containers and Docker

- Container Fundamentals
- What is a Container
- What is Docker
- Hypervisor Virtual Machines
- How containers work
- Containers and Microservice Architectures
- Getting Started with Docker
- Labs

Getting Started With Docker

- Installing Docker – Native Linux
- Installing Docker – Other Operating Systems
- Docker Toolbox
- Docker Machine Basics
- Running your first Container
- Developing a Microservice

Dockerfile

- Instructions and images
- FROM
- RUN
- Building Images
- The Build Context
- Adding files to an Image
- Executing Commands
- Specifying an Entrypoint

Docker Port Mapping

- Multi Container Hosting
- Automatic Port Mapping
- Specific Port Mapping

Deployment Patterns

- Service instance per host
- Multiple service instances per host

- Service instance per VM
- Service instance per container

Communication Patterns

- API Gateway
- Partial Failures
- Circuit Breaker

Service Discovery Patterns

- Client Side Discovery
- Server Side Discovery
- Service Registry
- Self Registration
- 3rd Party Registration

Data Management Patterns

- Shared Database
- Database per Service
- Event Driven Architecture
- Event Sourcing
- Transaction Log Tailing
- Database Triggers
- Application Events
- CQRS
- Domain-Driven Design (DDD)

DockerHub

- What is Docker Hub
- Creating an account
- Creating a Repository
- Markdown Format
- Pushing an Image
- Integrating Multiple Microservices
- Labs

Microservices Detail

- The Monolith vs Microservices overview
- Cloud-Native Apps
- High Availability, Scalability, Efficiency
- Code repositories (such as Git) (covered as needed)
- Continuous Integration, Continuous Delivery (CI/CD) (such as Jenkins) (covered as needed)
- How Pivotal Cloud Foundry Enables Continuous Delivery

Microservices Security

- Why it's so important
- Microservice Security Principles
- Access Tokens
- Oauth 2.0
- Kerckhoff's Principle
- Shannon's Maxim
- Security through obscurity
- General Security Considerations
- Middleware Security Considerations
- Edge Services Security Considerations
- Web and Other Client Security Considerations

- People and Process Security Considerations
- REST Interfaces to MicroServices
- What is a RESTful Web service?
- HTTP verbs
- HTTP response codes
- Versioning Strategy
- Richardson Maturity Model
- Example scenario
- Key Principles of RESTful Web Services
- Using JAX-RS

Spring Framework

- Review of Spring Essentials
- Why Spring
- Configuration using Spring
- Bean creation
- Data Management

Spring Boot Introduction

- Introduction to Spring Boot
- Value Proposition of Spring Boot
- High-level Spring Boot features
- Creating a simple Boot application using Spring Initializer web-site
- Spring Boot Dependencies, Auto-Configuration, and Runtime
- Dependency management using Spring Boot starters
- How auto-configuration works
- Configuration properties
- Overriding auto-configuration

• Using CommandLineRunner
• JPA With Spring and Spring Data

Quick Intro to ORM with JPA

• Benefits of Using Spring with JPA
• Configuring Spring JPA with Spring Boot
• Spring Data JPA dynamic repositories.
• Spring MVC Architecture and Overview
• Introduction to Spring MVC and Request Processing
• Controller method signatures
• Using @Controller, @RestController, and @GetMapping annotations
• Configuring Spring MVC with Spring Boot
• Spring Boot packaging options: JAR or WAR
• REST With Spring MVC

An Introduction to the REST Architectural Pattern

• Controlling HTTP Response codes with @ResponseStatus
• Implementing REST with Sprign MVC, @RequestMapping, @RequestBody and @ResponseBody
• Spring MVC's HttpMessageConverters and automatic content negotiation

Container Orchestration with PKS

• Introducing PKS Container Orchestration
• Deploying the App in PCF and PKS
• PKS Overview

MongoDB

- Introducing MongoDB
- NoSQL vs NewSQL vs SQL
- MongoDB and Containers
- MongoDB and Microservices

Project: Creating Containerized Spring Boot App

- Create Sample App With Spring Boot
- Create Docker Image
- Deploy Docker Image to PKS

Project: Conversion of Monolithic App to Microservices

- Create Monolithic App With Spring Boot
- Rearchitect to Microservices
- Containerize
- Deploy to PCF