MICROSERVICES Using Spring Boot and Java

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Objectives

- Understand and differentiate between various Microservices Architectural styles
- Apply Microservices Architecture principles
- Know how to make the appropriate Microservice Architecture decision
- Develop and test a Microservice
- Know what technologies can be used to enable Microservices with an example
- You will be able develop MICROSERVICES with Spring Boot
- You will be able to develop and design RESTful web services with Spring Boot
- You will setup Centralized Microservices Configuration

Lab Setup

- Windows 10 / Linux / Mac OS with 8 GB RAM
- JDK 1.8
- STS bundle Latest
- Open Internet access.
- MongoDB
- MySQL

Day 1

- Breaking Up Monoliths – Pros and Cons Traditional Monolithic Applications and Their Place
- Disadvantages of Monoliths Developer's Woes Architecture Modernization Architecture
- Modernization Challenges Microservices Architecture is Not a Silver Bullet!
- What MayHelp? In-Class Discussion Summary

MicroserviceDevelopmentWhatareMicroservices?

- Microservices vs Classic SOA Principles of Microservices Architecture

- Design Domain-Driven Design Domain-Driven Design – Benefits Microservices and Domain-Driven Design Designing for failure
- Microservices Architecture – Pros
- Microservices Architecture – Cons

- Docker and Microservices Microservice Deployment with Docker
- Workflow Writing Dockerfile
- Kubernetes Microservices and Various Applications Web Applications Web Applications
- Reference Architecture Web Applications – When touse?
- Single Page Applications
- Single Page Applications – Benefits
- Traditional Enterprise Application Architecture Sample Microservices Architecture

Serverless & Event-driven Microservice

Twelve-factor Applications

Twelve-factorApplications

Twelve Factors, Microservices, and App Modernization

The Twelve Factors Categorizing

The 12 Factors 12-Factor Microservice Codebase

12-Factor Microservice Dependencies

12-Factor Microservice Config

12-Factor Microservice Backing Services

12-Factor Microservice Build, Release

Day 2

Run 12-Factor Microservice Processes

12-Factor Microservice Port Binding

12-Factor Microservice Concurrency

12-Factor Microservice Disposability

12- Factor Microservice Dev/Prod Parity

12-Factor Microservice Logs

12-Factor Microservice AdminProcesses

REST Services Many Flavors of Services

Understanding REST Principles of RESTful Services

REST Example

- Create REST Example
- Retrieve REST Example
- Update REST Example
- Delete REST Example
- Client Generated ID

SOAP Equivalent Examples REST Example – JSON Famous RESTful Services Additional Resources What is gRPC? Protocol Buffers REST vs. gRPC Protobuf vs. JSONHTTP/2 vs. HTTP 1.1 HTTP/2 vs. HTTP 1.1 (Contd.) Messages vs. Resources and Verbs Streaming vs. Request-Response Strong Typing vs. Serialization Web Browser Support

REST vs. gRPC – In a Nutshell

SPRING BOOT

Spring Boot Starters Spring Boot Auto-configuration Spring Boot Actuators Spring Boot MVC Spring BootTest

Day 3

SPRING MICRO SERVICES

Introduction Evaluation of Micro Services Principles Of Micro Services Characteristics of Micro Services Micro services Benefits Relationship with SOA

Twelve Factor Apps Micro Services use cases Micro Services early adopters Building micro services with boot Micro Services Capability model Micro Services Use case

SPRING JPA Application Managed Container Entity Managed ContainerApplication

SPRING DATA SPRING MESSAGING

JMS / AMQP ActiveMQ / RabbitMQ Server

Day 4

Implementing MicroServices With SpringBoot

•Setting up a development environment •Best Practices and Common Principles

Service discovery (consul/kubernetes service discovery) Blue-green, canary, rolling deployments

The Kafka Architecture The main components of Kafka Use cases for Kafka The contents of Kafka's /bin directory How to start and stop Kafka How to create newtopics

How to use Kafka command line tools to produce and consume messages Kafka Streams Relying on Kafka Topics for Storage Relying on Kafka for System State Kafka Event-Driven Microservice Architecture

Rate Limiting Rate Limiting – Business Cases Configuring Rate Limiting in NGINX

Day 5

Circuit Breaker

Design Principles Design Principles (continued) Cascading Failures

Bulkhead Pattern Circuit Breaker Pattern Thread Pooling Request Caching

Request Collapsing Fail-Fast

Fallback Circuit Breaker Solutions Load Balancing in Microservices Server-side load balance Client-side Load Balance Architecture Service Mesh Service Mesh (Contd.) Service MeshSolutions Content Delivery Network (CDN) How does a CDN Work? Benefits of using a CDN CDN Solutions

JWT Intrduction to JSON Web Token Authorization Information Exchange JWT Structure Header Payload Signature Microservices communication using secured JWT

Distributed transaction Isolate user actions for concurrent requests Transactionatomic Two-phase commit (2pc) pattern SagaPattern Eventual Consistency and Compensation

Leading Practices for Microservice Logging Logging Challenges Leading Practices Correlate Requests with a Unique ID Include a Unique ID in the Response Send Logs