MICROSERVICES ARCHITECTURE ADVANCED

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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 May Help?
In-Class Discussion
Summary

Microservice Development
What are Microservices?
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 to use?
Single Page Applications
Single Page Applications – Benefits Traditional Enterprise Application Architecture
Sample Microservices Architecture
Serverless & Event-driven Microservice

Twelve-factor Applications
Twelve-factor Applications
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,
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 Admin Processes

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 Boot Test

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 CLOUD

- Spring Config Server
- Spring Cloud Bus
- Feign Rest client
- Load Balancing Using Ribbon
- Registry Using Eureka server

SPRING JPA

- Application Managed Container
- Entity Managed Container
- Application

SPRING DATA
SPRING MESSAGING

- JMS / AMQP
- ActiveMQ / RabbitMQ Server

Implementing MicroServices With SpringBoot

•Setting up a development environment

•Best Practices and Common Principles
•NovelHealthCare Project Overview
•Implementing super admin, admin, doctor and patient microservices

- Controller Components
- Service Components
- Entity/Domain Components
- Repository Components

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 new topics
- 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 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 Mesh Solutions
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
Transaction atomic
Two-phase commit (2pc) pattern
Saga Pattern
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 to a Central Location
Structure Your Log Data
Add Context to Every Record
Examples of Content
Write Logs to Local Storage
Collecting Logs with Fluentd