

# Java Spring Boot MicroServices Index

## Java Language Fundamentals

Variables

Static variables

Instance variables

Local variables

Reference variables

Instance flow

Static Flow

Interface

default methods in interface (JAVA 1.8)

static methods in interfaces (JAVA 1.8)

private methods in interface (JAVA 1.9)

Anonymous Innerclass

Lambda Expression

- Rules

- Examples

.forEach (JDK 1.8 )

Predefined Java Functional interfaces

Predicate

Filter

Consumer

Supplier

**Stream API**

Comparator

Comparable

Sorting Data using Java 8

Default Sorting

Customized Sorting

Abstract Classes

Use cases

Rules

interfaces vs abstract class vs class

Multithreading Java

- Runnable & Thread

- Executor Framework

- Execute Service, Callable , Future

- ForkJoinPool

- CompletableFuture (Java 1.8 )

Runnable + Lambda Expression

Annotation (JDK 1.5)

- Java Predefined Annotations

@Override , @Deprecated, @SuppressWarnings, @FunctionalInterface(1.8)

- Custom Annotations

Declarations

Usage

Processing

Java Reflection API

Class, Method, Field, Constructor

## **MAVEN**

- What is Build tool
- Maven Installation
- pom.xml
- Repositories ( Central / Local / Remote)
- Creating Maven Project From Eclipse
- Archtype
- Group Id
- Artifact Id
- Version (Snapshot vs Release[GA])
- Settings.xml
- Dependencies Management
- Dependency Resolution Process
- Project Structure
- Maven Lifecycle
- Parent POM
- Custom Parent POM like Spring Boot Parent
- Creating Maven Project
- Multi Module Maven project

## **Spring Core**

- History
  - Release history
  - Java vs Spring
  - Java Version Compatibility with Spring
- First Spring Example
- Configuring Metadata in Spring
- XML
- Annotations (Component Scan)
- Java (@Configuration/ @Bean)
- XML vs Annotation vs Java configuration
- Ways to create SpringBoot applications
- Spring Initializer (<https://start.spring.io>)

- Using IDE ( Eclipse /STS/ IntelliJ IDE)
- Converting Maven project into Spring boot project

Spring Boot First Example

Spring Boot Java Configuration

Spring Boot XML Configuration

Duplication Id in Spring configuration

NoUniqueBeanDefination

Inversion Of Control (IOC)

- Dependency LookUP (Dependency Pull / Contextualized DL)
- Dependency Injection

CDI (Constructor Dependency Injection)

SDI (Setter Dependency Injection)

- CDI vs SDI
- CDI Use Cases
- SDI Use Cases

CDI in XML & Java Configuration

SDI in XML & Java Configuration

Circular Dependencies ( CDI vs SDI)

Dependency Resolution Process

@Autowired

- by Type
- by Name
- by Constructor

@Qualifier

@Primary

**@Autowired**

- required false

Bean Lazy Initialization

Bean Dependency

Bean initialization callbacks

- InitializingBean ( afterpropertiesSet)
- @PostConstruct
- Java/XML init method configuration

Bean destruction callbacks

- Disposablebean (destroy)
- @PreDestroy
- Java/XML destroy method configuration

Bean Scopes

- Singleton
- Prototype
- Request
- Session
- Application

- Custom Scope

### **Mixing 2 Scopes (Singleton + Prototype)**

- Method Injection
- Java Singleton vs Spring Singleton

### **Spring Bean Instantiation Types**

- XML Configuration
- Java Configuration
- How to Instantiate singleton classes using Spring

## **Spring Boot**

- Maven Spring Boot Configuration
- Running the Example
- Creating an Executable Jar
- Spring Boot Maven Plugin
- Running Spring Boot Application from Command Line

### **Spring Boot Application startup Failure**

### **Spring Boot Project Structure Best practises**

Spring Boot default properties/yml file support (application.properties/ application.yml)

### **Auto Configuration**

How to disable AutoConfiguration

### **Developer Tools**

### **Externalized Configuration**

- Application Property Files
- Accessing Command Line Properties
- Placeholders in Properties
- YML vs Properties
- JavaBean properties binding
- @ConfigurationProperties
- @PropertySource
- @PropertySources
- @Value
- Environment.java
- Binding Relaxation

### **Profiles**

- Spring Boot Profile Management
- How to activate profile dynamically
- profile specific properties configuration

### **Logging**

- Log Format
- Console Output
- Spring Boot Logback
- Profile-specific Configuration

## **Servlet API**

Http Protocol

Http Methods

- GET
- POST
- PUT
- DELETE
- TRACE
- HEAD
- Options etc...

Http Status Code

- 100 - 200
- 200 - 300
- 300 - 400
- 400 - 500

GET vs POST vs PUT vs DELETE

Http Request Template

Http Response Template

Interfaces

Servlet

- Life cycle methods

GenericServlet

HttpServlet

**Servlet Life Cycle**

URL formation

## **Spring MVC + Boot**

Spring Boot MVC First application

Spring MVC

- web.xml + spring XML configuration
- without web.xml + Spring Java Configuration
- without web.xml + Spring XML Configuration

## **Spring Boot Restful Web services**

Spring Boot vs Spring MVC

Dispatcher Service AutoConfiguration

mobile-service microservice implementation

<http://localhost:8080/msk/mobiles> → GET all mobiles

<http://localhost:8080/msk/mobiles/{mobileId}> → GET mobile by mobile Id

<http://localhost:8080/msk/mobiles> → POST to save mobile

<http://localhost:8080/msk/mobiles/{mobileId}> → Delete to delete a mobile

<http://localhost:8080/msk/mobiles> → PUT method to update mobile Info

@Controller vs @RestController

@RequestBody vs HttpEntity

@ResponseBody

@PathVariable

@GetMapping

@PostMapping

@PutMapping

@DeleteMapping

@RequestParam

@RequestHeader

@ResponseStatus

@CookieValue

@ModelAttribute

@SessionAttribute

@RequestAttribute

Single endpoint to give json and xml data

produces and consumes

content-type and accept

Spring MVC Complete Application ( Profile Creation + Login + Dashboard + Logout)

Redirect vs Forward

Throwing Custom Exception Handling

### **ExceptionHandling in Micro services**

DefaultExceptionHandler

@ResponseStatus - Exception level Exception Handling

@ExceptionHandler - Controller Level Exception Handling

@ControllerAdvice - Global Exception Handling

Request Pre -Post processing

Interceptors

### **Filters**

Multiple filters configuration

### **Logging Response time**

@CrossOrigin

### **Spring Boot Swagger Integration (Open API)**

Web services, there are two development styles.

- Contract First

- Contract Last

Writing Client service to invoking mobile-service

### **mobile service client**

### **RestTemplate**

- getForObject

- getForEntity

- postForObject

- postForEntity

## **Spring Boot MVC Functional Endpoints**

- RouterFunction
  - HandlerFunction
  - ServerRequest
  - ServerResponse
- Implement mobile-service -functional micro service

## **Spring Jdbc + Boot**

Java JDBC API  
Jdbc Template  
NamedParameterJdbcTemplate

### **Country-Service Microservice**

## **Spring Data JPA + Boot**

Introduction  
JDBC vs JPA  
Repository  
CrudRepository  
JpaRepository  
Native Spring Data Jpa first Example  
Spring Data JPA

- default methods in JpaRepository & CRUDRepository

findBy - Method support in data jpa  
SQL vs JPQL  
Data Filtering using @Query  
**@Query**

- Place Holders (?1)
- Named Parameters
- Native Query

Data Filtering in Data Jpa using @Query\*\*  
**@NamedQuery**  
**@NamedQueries**  
**@NamedNativeQuery**

### **Specifications**

- JpaSpecificationExecutor
- Data Filtering With JPA Specifications

Sorting + Pagination

## **Validation + Boot**

Bean Validation for Microservices  
Loading Error messages from properties file  
Handling Error Messages through Global Exception Handler

### **Returning Common Response from Micro services (Success & Failure cases)**

## Spring AOP + Boot

- Aspect
- Advice
  - \* @Before
  - \* @AfterReturning
  - \* @AfterThrowing
  - \* @After Finally
  - \* @Around

- PointCut

- JointPoint

@PointCut

Combining Pointcut Expressions

Pointcut Expression Examples

**Implementing Logging Functionality in Micro Services using Spring AOP**

Annotation Model Spring AOP

## Spring Soap WebServices + Boot

- Contract First vs Contract Last
- SOAP vs REST
- First Spring Boot Soap Web services
- @Endpoint , @Payload, @RequestPayload, @ResponsePayload
- Exception Handling in Soap Web Services
- Client program to invoke Soap web service (WebServiceTemplate)
- Securing Spring Soap Web Services

## Parent module

### Common module

- Making Response type as generic
- Moving Common configuration into common module

## Spring Reactive Programming + Boot

- What is Blocking API
- Why We need reactive programming
- Reactive stream API
- Reactive Stream API vs Java 9 Flow
- Project reactor vs RXJava
- Publisher , Subscriber , Subscription, Processor
- Mono , Flux introduction
- Project reactor standalone project example
- Operators on Mono
- Operators on Flux
- filter / map/ flatMap
- Creating Mono / Flux
- Subscribing Publisher (subscribe / block)



## **MongoDB installation on Cloud**

### **Reactive Restful web service first example with Spring Web Flux + Mongo DB**

Micro Service Development With Spring Reactive Programming

- CRUD Operations with Spring WebFlux

Spring Webflux Integration

- Open Api
- AOP Integration to log each method execution time
- ResponseTimeFilter
- Validations through properties file

## **Spring Security + Boot**

- Authentication vs Authorization
- Default Security
- Custom User Name & Password with Default Security
- Configuring Users with InMemory Database
- Configuring Authorities with InMemory Database
- Http Basic authentication
- Http Form based authentication
- Spring Security + JDBC
  - DefaultSchema + H2 DB
  - Custom Schema + H2 DB
  - DefaultSchema + MySql
  - Custom Schema + H2 DB
- Spring Security + Data JPA
- JWT token based authentication

## **Spring Testing + Boot**

- Unit Testing With Spring Testing
- @SpringBootTest
- @SpringBootTest vs @RunWith(SpringRunner.class)
- Unit Testing With Spring Testing Mockito
- Integration Testing using @SpringBootTest
- @Mock
- @MockingBean

## **MicroServices + Spring Cloud + Spring Boot**

- Advantages of Microservices Architectures
- Spring Boot Actuator API
- Connect Spring Cloud Config Server
  - Installing Git
  - Creating Local Git Repository
  - Connect Spring Cloud Config Server to Local Git Repository
  - Configuration for Multiple Environments in Git Repository

- Client-Side Load-Balancing with Spring Cloud LoadBalancer
- Introduction to API Gateways
  - Setting up Zuul API Gateway
  - Implementing Zuul Logging Filter
  - Executing a request through Zuul API Gateway
  - Setting up Zuul API Gateway between microservice invocations
- Introduction to Distributed Tracing
  - Implementing Spring Cloud Sleuth
  - Introduction to Distributed Tracing with Zipkin
- Understanding the need for Spring Cloud Bus
  - Implementing Spring Cloud Bus
- Fault Tolerance with Hystrix
- **MicroServices Centralized logging with ElasticSearch + Kibana**

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