SPRING BOOT AND CLOUD WITH MICROSERVICES

Spring Boot

a) Spring Boot - PART-I:

1. Boot Basic and Features
   - Need Of Spring Boot
   - Spring V/s Boot
   - Components in Boot
   - Boot Architecture
   - Types of Files in Boot
   - Advantages of Boot
   - Boot Dependencies
   - Maven Boot Plug-in
   - Parent Project in Boot

2. First Application in Boot
   - Basic Annotations in Boot
   - Execution Flow
   - Boot Starter class
   - Application Properties
   - Server Port Change
   - Managing of Dependencies
   - Common Problem in coding
   - @SpringBootApplication

3. Customizing the Banner
   - Spring Boot Banner
   - Banner Example

- Text Banner
- Custom banner

4. Runners in Spring Boot
    - Command Line Runner
    - Application Runner
    - Multiple Runners with Order
    - Runner Configuration
    - Inputs to Runner

5. Application Properties file
    - Properties file Need
    - XML/Properties
    - Finding Key-values
    - Option-args/Non option-args
    - Default values

6. Application YAML File
    - YAML structure
    - YAML Locations and Order
    - Snake YAML Execution Flow

7. POM structure for Boot
    - Why POM
    - Role of POM Elements
    - Parent Project
    - Properties in POM
    - Version Management

8. Profiles in Spring boot
    - @Profile annotation
    - Customer/Environment Specific coding
    - Profile Properties
    - Profiles YAML

9. Building Application (.jar,.war)
    - What is Build plug-in
    - Maven Clean and Install
    - target folder and .jar and .war

10.   Spring Boot starter class

- @SpringBootConfiguration
- @EnableAutoConfiguration
- @ComponentScan

11. Spring Boot stand alone Application
- Writing Stand alone Application
- Service Examples
- Printing Messages

12. Spring Boot Configuration
- Writing Application Configuration
- Java and Annotation Configuration
- Auto detection of Configuration File

13. Lombok API
- @Data
- @Getter
- @Setter
- @ToString
- @EqualsAndHashCode
- @NoArgsConstructor
- @RequiredArgsConstructor
- @AllArgsConstructor
- @NonNull

14. Basic Annotations and Execution flow
- @Service
- @Component
- @Scope
- @Bean
- @Configuration
- @ConfigurationProperties
- @Order
- @Profile
- @Value
- @PropertySource

b) Spring Boot PART-II:

15.   Spring Boot Email
- Java MAIL API structure
- Mail Properties
- Boot Mail Design
- Simple Email
- Mime Email with Attachments

16.   Spring Boot Web Applications
- Design of Web Applications
- Layers in Web Application
- Spring Boot MVC Model
- Writing of Controllers
- JSP UI Design
- Thymeleaf UI Design

17.   Embedded Server and Databases
- Need of Embedded Components
- Knowing Servers Configuration
- Working with Tomcat
- Working Jetty Servers
- Working with Undertow
- H2 Database and Console
- HSQLDB
- Apache Derby

18.   Spring Boot Jdbc
- Curd Repository
- Basic Operations
- Execution with Different Dbs
- Database Connection Properties

19.   Spring Boot Data JPA
- JPA Repository
- JPA DB Operations (CURD)
- findAll and findBy methods
- @Query Annotation for HQL
- JPA Properties Configuration

20.   Spring Boot MongoDB
- Mongo Repository
- Document and Models Design
- JSON Format
- Basic Operation
- Embedded Mongo Db
- External Mongo Configuration
- Mongo DB Security

21.   Spring Boot AJAX
- Synchronous v/s Asynchronous
- AJAX introduction
- JQuery AJAX call models
- Integration with RestController

22.   Spring Boot Connection Pooling
- Types of Temporary Memories
- Need of Pooling
- Pooling v/s caching
- Hikari CP Configuration

23.   Spring Boot Pagination and Sorting
- Pagination Introduction
- Google Example for Pagination
- Pagination And Sorting Repository
- Page and Pagleabe objects
- default values for Pagination
- Sorting Directions

b) Spring Boot PART-III:

24.   Message Queue(MQ)
- Introductions to MQs
- Need of MQs
- Coding using Active MQ

- Rabbit MQ Example
- Apache Kafka

25. Spring Boot Security
- Boot Security Design
- Authentication and Authorizations
- Roles and AntMatcher ULR Patterns
- In Memory Authentication
- Default Form Logins
- Custom Form Creation
- Jdbc Authentication
- JPA/Hibernate(ORM) Authentication
- OAuth2 Security Design
- OAuth2 Client Application Design

26. Rest Web services and Operations
- Need of JSON
- JSON and It's Auto Conversion
- Testing Using POSTMAN
- Types of HTTP Methods
- PUT
- GET
- DELETE
- POST
- Parameters (HeaderParam, Request Param..)
- ResponseEntity Format
- @RequestBody and @ResponseBody Format

27. Spring Boot with Swagger
- What is API Endpoints
- Swagger Introduction
- Design of SwaggerUI
- Coding for RestController
- Testing Swagger Operations

28. Spring Boot Profiles
- Need of Profiles
- Environments and Profiles
- Defining Profiles
- Execution Of profiles

29. Spring Boot DevTools
   - What are DevTools
   - Dependency for DevTools
   - Working with DevTools

30. Spring Boot Task Scheduling
   - Schedulers Introduction
   - Task Management
   - fixedDelay and fixedRate
   - cron expression

31. Spring Boot Actuator
   - Production REST Endpoints
   - Sensitive and Insensitive end points
   - Dependency for Actuator
   - Executing endpoints
   - finding logs
   - Beans in container
   - Health check
   - Current Environment

32. Spring Boot batch API
   - Batch API Introduction
   - Item Reader, Writer and Processer Design
   - StepConfiguration
   - JobConfiguration
   - JobExecutionListsner
   - CSV to MySQL Batch Programming

Microservice :

1. Monolithic Applications
   - Introduction of Layers Application
   - Modules Integration
   - Implementation of Monolithic Applications

2. Drawbacks of Monolithic applications
   - Problems in Design
   - Load Balancing
   - Parallel Coding and Testing

3. SOA Introduction
   - What is SOA
   - SOA as Design Pattern
   - Components of SOA
   - Consumer and Producers
   - Registry and Discovery Component

4. Microservices Introduction
   - Importance of microservices
   - Services in Application
   - Monolithic to Microservices
   - Architecture and Implementation styles

5. Design of Microservices
   - Eureka Server as Registry and Discovery
   - Registry server
   - Consumer Discovery

6. Intra Communication of Microservices
   - Provider and Consumer Integration
   - Sending/Receiving Data
   - HTTP Methods Examples

7. Data passing types (JSON,XML)
   - HTTP Parameters
   - HTTP Body for Data passing
   - Object to JSON Format
   - Object to XML Format

8. Need of Load balancing
   - What is Load balancing
   - Types of Load Balancing
   - Ribbon for Client Load balancing
   - Zuul for Server Load Balancing

9. API creation for Microservices

- Defining Consumer for RestController
- Paths and Parameters
- Using API for Integration

Spring Cloud:

1. Spring cloud Architecture
   - Components
   - Service Registry
   - API Gateway
   - Config Server
   - Config Client
   - Load Balancer
   - PCF
   - Circuit Breaker
   - Cloud Integrations

2. Discovery and Registry server
   - Netflix Eureka Server Example
   - Application Properties
   - Dependencies Introduction
   - Spring Boot version and Cloud version

3. Provider and Consumer Microservices
   - RestTemplate Introduction
   - Eureka server Registry
   - Provider Creation and Register with Eureka
   - Consumer Application and Register with Eureka
   - Application Configuration for RestTemplate
   - Consumer and Provider Integration

4. Config server and Config Client
   - Need of Config Servers
   - Local File System
   - Git Config Servers
   - Eureka with Config server
   - Provider and Consumers with Config Client

5. API for Gateway Proxy
   - What is API Gateway
   - Netflix Zull Gateway example
   - Zull project Properties
   - Integration with Eureka and PC App

6. Loading Balancing
   - Need Of load Balancing
   - Netflix Ribbon Example
   - Provider Load Balancing
   - Ribbon with Eureka - PC APP

7. Fallback methods and Circuit Breaker
   - Exception Handling in Cloud
   - Fallback methods
   - Hystrix Circuit Breakers
   - Hystrix Dashboard

8. Securing API
   - Security Design
   - Securing End Points
   - OAuth 2.0 Introduction
   - OAuth2.0 Implementation

9. Zipkin and Sleuth
   - Logging and Tracing in Microservices
   - Log4J for Microservices
   - Need of Sleuth
   - Zipkin UI Tracer

10. Pivotal Cloud Foundry (PCF)
    - What is PCF
    - Register and Validate Account
    - Installing PCF in system
    - Push Microservice to PCF
    - Service Dashboard
    - PCF Basic Commands

11. Admin UI

- Admin UI usage
- Configure Dependency
- Actuator with Admin UI

Case study [Employee Module]

- ✓ Spring Boot Design and Coding
- ✓ Converting to Microservices
- ✓ Deploy in PFC
- ✓ Integrate with Spring Apps

Spring Boot with Tools

- ➢ Eclipse, STS
- ➢ Maven
- ➢ Gradle
- ➢ Github
- ➢ start.spring.io
- ➢ JUnit With Mocking
- ➢ Logging
- ➢ Reference Documents
- ➢ Docker
- ➢ FAQs