

# AWS Development, AWS DevOps, Java, Spring Boot, Microservices

**Program Duration:** 128 hours

**Prerequisites:**

- Good knowledge on Java and OOP
- Good knowledge on Basics of Cloud

**Content Content Breakdown:**

- **Java: 20 Hours**
- **Spring Boot: 20 Hours**
- **Microservices: 48 Hours**
- **AWS Development: 28 Hours**
- **AWS DevOps: 12 Hours**

**Java (20 Hours)**

**Day 1 1. Introduction to Java**

- Java Basics
- Setting up Development Environment
- Writing First Java Program-

**Lab :** Basic Java Programs

**Day 2 2. Object-Oriented Programming**

- Classes and Objects
- Inheritance
- Polymorphism
- Encapsulation and Abstraction
- Lab:** Inheritance, Polymorphism

**Day 3 3. Java Collections Framework**

- List, Set, Map
- Iterators and Streams
- **Lab:** 1) create read update and delete operation on java collections
- 2) Use streams on collections

**Day 4 4. Exception Handling and Multithreading**

- Try-Catch Blocks
- Custom Exceptions
- Threads and Concurrency
- Lab:** 1) Create exception and use it
- 2) Multithreading in java with share object

**Day 5 5. Java writing unit test**

- unit test with test driven development
- Junit
- Mockito
- **Lab:** Writing unit test and use of Mockito

**Spring Boot (20 Hours)****Day 6 1. Introduction to Spring Boot**

- Spring Boot Basics
- Setting up Spring Boot Project
- **Lab:** Creating a Basic Spring Boot Application with maven and start with command line

**Day 7 2. Dependency Injection and Inversion of Control**

- Beans and Components
- Auto wiring
- **Lab:** Create Spring boot application with Dependency Injection with

**3. Spring Boot Unit Test**

- Unit test annotation
- Mocking with spring boot
- Unit test coverage
- **Lab:** Create Spring boot application with unit test and its coverage

**Day 8 3.1 Spring Boot Data Access**

- Spring Data JPA
- CRUD Operations
- **Lab:** Building a Spring Boot JPA Application and store the student data in mysql

**Day 9 4. Restful Web Services with Spring Boot**

- Creating REST APIs
- Consuming REST APIs
- **Hands-on:** Create spring boot application with rest Api for Create, Read, Update and

Delete with student record from Data base

**Day 10 5. Spring Boot Security**

- Basic Authentication and Authorization
- JWT
- **Hands-on:** Create Application to restrict Api with Role based authentication with basic

security

**Microservices (48 Hours)****Day 11 1. Introduction to Microservices**

- Monolithic vs Microservices
- Principles of Microservices Architecture
- 12 factor app

**Day 12 2. Docker Introduction**

What is docker  
Docker volume  
Docker network

**Lab:** Use of different docker commands and its uses

**Day 13 3. Docker with Microservice**

Docker image  
Docker container  
Create docker file

**Lab:** Create image and container for spring boot messaging microservice

**Day 14 4. Running docker container with docker compose**

Running docker container  
Docker composes as a tool  
Docker compose command

**Lab:** Create Docker-compose for messaging microservice

**Day 15 5. Microservices communication with Spring Boot**

- Setting up Microservices
- Synchronous Communication between Microservices
- **Lab** Creating Microservices Rest communication with Spring boot and run in docker

container

**Day 16 6. Microservice message broker**

- Active MQ
- SQS
- RabbitMQ
- Use of message broker in microservice
- **Lab**: Run message broker in docker active mq

**Day 17 7. Inter-Service Communication**

- Asynchronous Communication between Microservices
- message communication between microservice
- **Lab**: Create two microservice with message exchange between them

**Day 18 8. Component test for microservice**

- Component test infrastructure
- Component test with spring boot
- Mocking in component test
- **Lab**: Write component test for message broker

**Day 19 9. API Gateway and Service Discovery**

- Netflix Zuul
- Eureka
- **Lab**: Create Spring boot microservice and use eureka service discovery with student

application

**Day 20 10. Data Management in Microservices**

- Database per Microservice
- Spring Data
- MySQL

- **Lab:** Spring boot microservice CRUD with MySQL with spring data

#### **Day 21 11. Monitoring and Logging**

- Logging framework in microservice
- log back
- Hierarchy of logging
- Enable disable logging in spring boot
- **Hands-on:** Implementing Monitoring and Logging with spring boot

#### **Day 22 12. Case Study and Project**

- End-to-end Microservices Project
- **Lab:** Create microservice project with unit test component test and data storage with logging
- Deploy and run in docker container

### **AWS Development (28 Hours)**

#### **Day 23 1. Introduction to AWS**

- Overview of AWS Services
- Setting up AWS Account
- AWS Global Infrastructure

#### **Day 24 2. Compute Services- ECS**

- Fargate cluster Overview
- Use case of ECS
- ECS Setup and Configuration
- ECS Management
  - Cluster Management: Updating, scaling, and maintaining EKS clusters.
  - Monitoring and Logging: Integrating with AWS CloudWatch,
- **Hands-on:** Creating ECS service task and management

#### **Day 25 3. Compute Services- EKS**

- EKS fundamental
- EKS Setup and Configuration
- EKS Management
  - Cluster Management: Updating, scaling, and maintaining EKS clusters.
  - Monitoring and Logging: Integrating with AWS CloudWatch,
- **Hands-on:** Creating EKS service task and management

**Day 26 4. Compute Services- EKS with microservice**

Deploying Applications: Deploying sample applications on EKS.

Managing Workloads: Practical exercises on managing Kubernetes workloads.

Troubleshooting: Common issues and troubleshooting steps for EKS.

Logging

- **Hands-on:** Deploy Spring boot microservice in EKS

**Day 27 5. Database Services**

Introduction to DynamoDB: Overview, benefits, and use cases.

Core Concepts: Tables, items, and attributes.

Data Types: Scalar types, document types, and set types.

Primary Keys: Partition keys, composite keys (partition key and sort key).

Secondary Indexes: Local secondary indexes (LSI) and global secondary indexes (GSI).

Query and Scan: Differences between query and scan operations, use cases, and performance considerations.

- **Lab:** RDS Instance Creation and DynamoDB Table Management.

**Day 28 6. Messaging and communication**

- SQS

- SNS

- **Lab:** Setting up SNS and SQS, Aws command line to access sqs and SNS, Spring boot application to publish and subscribe sqs

**Day 29 7. Case Study and Project**

- End-to-end Microservices Project with sqs message publish

- **Lab:** Deploy the spring boot microservice end to end project in EKS with logging and monitoring

**AWS DevOps (12 Hours)****Day 30 1. Introduction to DevOps on AWS**

- DevOps Principles

- DevOps Tools on AWS

**Day 31 2. Infrastructure as Code**

- CloudFormation

- Terraform (Basic Introduction)
- **Lab:** Writing CloudFormation Templates to deploy spring boot in ECS and EC2

### **Day 32 3. Continuous Integration and Continuous Deployment**

- CodePipeline
- Code Build
- Code Deploy
- **Hands-on:** CI/CD Pipeline Creation
- Configuration Management
- OpsWorks
- Systems Manager
- **Lab:** Configuring OpsWorks Stacks