

# PHASE 1 — Core Java Foundation (Subtopics)

## ✓Object-Oriented Programming

- Classes, Objects
- Constructors, Constructor Overloading
- Method Overloading & Overriding
- this & super keywords

## ✓OOP Pillars

- Encapsulation
- Inheritance
- Polymorphism
- Abstraction

## ✓Collections Framework

- List (ArrayList, LinkedList)
- Set (HashSet, LinkedHashSet, TreeSet)
- Map (HashMap, TreeMap, LinkedHashMap)
- Iterator & ListIterator
- Comparable & Comparator

## ✓Exception Handling

- Try, Catch, Finally
- Throw, Throws
- Custom Exceptions

## ✓Java 8 Features

- Lambda Expressions
- Stream API (map, filter, reduce)
- Functional Interfaces
- Method reference

## ✓Multithreading

- Thread class, Runnable interface
- ExecutorService
- Synchronization

## PHASE 2 — Core Spring Framework (Subtopics)

### ✓Spring Intro

- History of Spring
- Problems solved by Spring
- Spring Architecture (7 modules)

### ✓Inversion of Control (IoC)

- What is IoC?
- IoC Containers
- Types of containers

### ✓Dependency Injection (DI)

- Constructor Injection
- Setter Injection
- Field Injection (why discouraged?)
- Autowiring modes

### ✓Spring Beans

- Bean lifecycle
- init() and destroy() methods
- Bean Scopes (Singleton, Prototype, Request, Session)

### ✓Spring Annotations

- @Component
- @Service
- @Repository
- @Controller
- @Autowired
- @Qualifier
- @Primary

### ✓Configuration Types

- XML-based config
  - Annotation-based config
  - Java-based config (@Configuration)
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## PHASE 3 — Spring AOP (Subtopics)

### ✓AOP Basics

- Cross-cutting concerns
- What is Aspect, Advice, JoinPoint, Pointcut?

### ✓Types of Advice

- @Before
- @After
- @AfterReturning
- @AfterThrowing
- @Around

### ✓Implementing Logging using AOP

- Method execution logs
- Time measurement logs

### ✓Transaction Management

- @Transactional
  - Rollback rules
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## PHASE 4 — Spring JDBC & ORM (Subtopics)

### ★ Spring JDBC

- JdbcTemplate
- NamedParameterJdbcTemplate
- ResultSetExtractor
- RowMapper
- PreparedStatementSetter

## ★ Spring ORM & JPA

- Introduction to ORM
- JPA vs Hibernate
- Entities
- @Entity, @Table
- @Id, @GeneratedValue
- Column mappings

## ★ Relationships

- @OneToOne
- @OneToMany
- @ManyToOne
- @ManyToMany
- Cascade Types
- Fetch Types (LAZY vs EAGER)

## ★ JPQL

- Basic queries
  - Named queries
  - Native queries
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# PHASE 5 — Spring Boot Fundamentals (Subtopics)

## ✓Spring Boot Features

- Auto-configuration
- Starter dependencies
- Embedded servers (Tomcat, Jetty)

## ✓Application Structure

- Main class (@SpringBootApplication)
- application.properties vs application.yml

## ✓Running Spring Boot

- Command line
- Maven
- Packaging into JAR

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# PHASE 6 — REST API Development (Subtopics)

## ✓Building REST APIs

- @RestController vs @Controller
- @GetMapping, @PostMapping, @PutMapping, @DeleteMapping
- PathVariables
- RequestBody
- ResponseEntity

## ✓Validations

- @Valid
- @NotNull, @NotBlank
- @Email, @Min, @Max

## ✓Exception Handling

- Custom exception classes
- @ControllerAdvice
- @ExceptionHandler
- Error response structure (industry standard)

## ✓JSON Handling

- Jackson
  - @JsonIgnore, @JsonProperty, @JsonFormat
  - DTO Design Pattern
  - Mapping DTOs using ModelMapper / MapStruct
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# PHASE 7 — Spring Data JPA (Subtopics)

## ✓Repository Layer

- CrudRepository
- JpaRepository
- PagingAndSortingRepository

## ✓Derived Query Methods

- `findByName`
- `findByEmailContaining`
- `findByIdAndStatus`

## ✓Custom Queries

- `@Query`
- Native Queries

## ✓Pagination & Sorting

- Page & Pageable
- Sort class

## ✓Transaction Management

- `@Transactional`
  - Isolation levels
  - Propagation types
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# PHASE 8 — Advanced Spring Boot (Subtopics)

## ✓Filters

- `OncePerRequestFilter`
- Authentication filters
- Logging filters

## ✓Interceptors

- `HandlerInterceptor`
- `PreHandle`, `PostHandle`, `AfterCompletion`

## ✓File Upload & Download

- `MultipartFile`
- Upload folder configuration

## ✓Scheduling

- `@EnableScheduling`
- `@Scheduled` (cron expressions)

## ✓Email Sending

- `JavaMailSender`
- SMTP Config

## ✓Profiles

- `@Profile`
  - `application-dev.yml`
  - `application-prod.yml`
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# PHASE 9 — Spring Security (Subtopics)

## ✓Security Basics

- Authentication vs Authorization
- `SecurityFilterChain`
- `PasswordEncoder` (`BCrypt`)

## ✓UserDetailsService

- Custom user table authentication
- Loading user roles

## ✓JWT Authentication

- Access Token & Refresh Token
- Generating JWT
- Verifying JWT
- Custom Authentication Filter
- Stateless session

## ✓Method Level Security

- `@EnableMethodSecurity`
- `@PreAuthorize`, `@PostAuthorize`

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# PHASE 10 — Microservices (Subtopics)

## ✓ Microservices Architecture Basics

- Monolithic vs Microservices
- Advantages & challenges

## ✓ Eureka Server & Client

- Service registry
- Service discovery

## ✓ Feign Client

- REST calling between microservices

## ✓ API Gateway

- Routing
- Filters
- Authorization at gateway

## ✓ Config Server

- Central configuration management

## ✓ Circuit Breaker (Resilience4J)

- Retry
- RateLimiter
- Bulkhead
- CircuitBreaker annotation

## ✓ Distributed Tracing

- Sleuth
  - Zipkin
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# PHASE 11 — Testing Spring Boot (Subtopics)

## ✓Unit Testing

- JUnit 5
- Mockito
- Mocking service/repository layers

## ✓Integration Testing

- @SpringBootTest
  - Testcontainers
  - MockMvc
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# PHASE 12 — SQL & DevOps (Subtopics)

## ✓SQL Advanced

- Joins
- Subqueries
- Window functions
- Indexing

## ✓Docker

- Dockerfile
- Docker Compose
- Containerizing Spring Boot + DB

## ✓CI/CD

- GitHub Actions
  - Jenkins basics
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# PHASE 13 — Projects (Subtopics)

## ★ Project 1: E-Commerce

- JWT Auth
- Product CRUD
- Cart & Orders
- Payment mock
- Admin dashboard
- Frontend: React/Angular

## ★ Project 2: Job Portal / LMS

- Microservices
  - API Gateway
  - Eureka
  - Logging
  - Docker deployment
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# PHASE 14 — Deployment (Subtopics)

## ✓ AWS EC2

- Launch instance
- Install Java, MySQL
- Deploy Spring Boot JAR

## ✓ Docker Deployment

- Build docker image
- Docker Compose with DB

## ✓ CI/CD

- Automated build
- Automated testing
- Auto deploy