

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

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

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

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

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

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

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