Mastering Groovy & Grails

- Total Duration: 8 days (8 hours/day)
- **Training Mode**: Theory + Hands-on exercises + Project Work
- **Prerequisites**: Java programming knowledge, basic functional programming concepts
- Target Audience: Beginner to Expert

Day 1: Introduction to Groovy & Setup (8 hours)

Goal: Understand Groovy's ecosystem, set up the environment, and write basic Groovy programs.

1. Groovy Introduction (1.5 hours)

- What is Groovy?
- Why use Groovy over Java?
- Key features of Groovy

2. Installation & Setup (1.5 hours)

- Downloading and installing Groovy
- Setting up Groovy Shell, Compiler, and Console
- IDE setup (IntelliJ IDEA/Eclipse)

3. Groovy Language Basics (3 hours)

- Variables and Types (Static vs Dynamic Typing)
- o Groovy Syntax, Comments, Identifiers
- Working with Strings, Numbers, Booleans, Lists, and Maps

4. Hands-on Exercises (2 hours)

- Write a "Hello World" program
- Experiment with dynamic typing and operators
- Create and manipulate lists and maps

Day 2: Groovy Language Essentials (8 hours)

Goal: Understand key Groovy syntax, operators, and object-oriented programming.

1. Operators & Expressions (3 hours)

- o Arithmetic, Logical, Bitwise, Relational, and Ternary Operators
- o Safe Navigation and Elvis Operators
- Operator Overloading

2. Program Structure (2 hours)

- Packages, Imports, Scripts vs Classes
- Methods and Variables

3. Object-Oriented Groovy (3 hours)

- Classes, Interfaces, Abstract Classes
- Constructors, Methods, Fields, and Properties

4. Hands-on Exercises

- Implement a simple calculator using Groovy operators
- o Create a class hierarchy with inheritance and method overloading

Day 3: Advanced Groovy Features (8 hours)

Goal: Learn closures, control structures, and functional programming in Groovy.

- 1. Closures in Groovy (3 hours)
 - Closure Syntax & Delegation Strategies
 - Functional Programming (Currying, Memoization, Method Pointers)

2. Groovy Semantics (3 hours)

- Statements (Variable Assignments, Destructuring, Control Structures)
- Expressions (GPath Expressions, Object Navigation)

3. Hands-on Exercises

- Write a closure-based filtering function for a list
- o Implement functional programming concepts using closures

Day 4: Metaprogramming, Exception Handling & File Handling (8 hours)

Goal: Master metaprogramming techniques and work with files in Groovy.

1. Metaprogramming in Groovy (3 hours)

- Runtime vs Compile-time Metaprogramming
- o AST Transformations & Grape Dependency Manager

2. Exception Handling (1 hour)

• Try/Catch/Finally, Multi-catch, Power Assertions

3. Working with Files (2 hours)

• Reading/Writing Files

• Searching & Modifying File Contents

4. Working with JSON & XML (2 hours)

- Parsing JSON & XML
- Using XmlSlurper, XmlParser, JSON Builder

5. Hands-on Exercises

- o Implement custom exception handling in a Groovy script
- Read and process a file to count word occurrences

Day 5: Introduction to Grails & MVC Pattern (8 hours)

Goal: Learn Grails fundamentals, setup, and MVC architecture.

- 1. Grails Overview (2 hours)
 - Introduction, Key Features, Setup & Installation

2. Creating a Grails Application (2 hours)

- Using the Grails CLI
- Exploring Project Structure

3. Grails MVC Architecture (2 hours)

- Controllers, Views, and Domain Classes
- 4. Hands-on Exercises
 - o Create a "Hello World" Grails web app
 - Develop a simple CRUD application using MVC

Day 6: Domain Modeling, Views & Tag Libraries (8 hours)

Goal: Learn Grails ORM (GORM), Querying, and Views.

1. GORM (Grails Object Relational Mapping) (3 hours)

- Defining Domain Classes
- o Associations & Relationships (One-to-One, One-to-Many, Many-to-Many)

2. GORM Queries & Criteria API (2 hours)

- Using Dynamic Finders & Criteria Queries
- Pagination & Sorting

3. Views & Tag Libraries (3 hours)

• Groovy Server Pages (GSP)

• Built-in & Custom Tag Libraries

4. Hands-on Exercises

- Implement database relationships in a domain model
- o Develop a form-based UI using Grails views

Day 7: Services, Plugins & Security (8 hours)

Goal: Learn service-oriented architecture, plugin management, and security in Grails.

- 1. Grails Services (2 hours)
 - Creating and Using Services
 - Dependency Injection

2. Plugins in Grails (2 hours)

- Finding & Installing Plugins
- Developing Custom Plugins

3. Security in Grails (2 hours)

- Using the Spring Security Plugin
- Authentication & Authorization

4. Hands-on Exercises

- Secure a web application using Spring Security
- o Build a custom Grails plugin for additional functionality

Day 8: REST APIs, Performance Optimization & Final Project (8 hours)

Goal: Build REST APIs, optimize performance, and work on a final project.

1. Building REST APIs in Grails (3 hours)

- Creating RESTful Controllers
- JSON/XML Responses
- 2. Performance Optimization & Best Practices (2 hours)
 - Performance tuning techniques
 - Error handling & debugging

3. Final Project (3 hours)

- o Develop a full-fledged Grails application implementing learned concepts
- 4. Presentation & Feedback

 \circ \quad Each participant presents their final project