KOENIG SOLUTIONS · COURSE OUTLINE

Advanced Angular: NgRx & Module Federation MFEs

10 Days	45	28
DURATION	TOPICS	HANDS-ON LABS

PREREQUISITES

- Knowledge of Angular Application Development

LEARNING OBJECTIVES

- Explain change detection strategies including OnPush and NgZone
- Build dynamic reactive forms with custom sync and async validators
- Configure advanced routing with guards, resolvers, and preloading
- Apply RxJS operators to manage state and asynchronous data flows
- Implement NgRx store, actions, reducers, selectors, and effects
- Apply performance optimisation techniques such as trackBy and pure pipes
- Develop unit and end-to-end tests for components, forms, and services
- Configure Angular micro frontends using Webpack 5 Module Federation

COURSE SYLLABUS

45 Topics

DAY 1 Advanced Angular Architecture & Change Detection

TOPICS

3 Labs

- Angular Application Architecture Review
- Deep Dive into Change Detection (Default vs OnPush, NgZone)
- Immutability and its effect on change detection

DAY 2 Reactive Forms and Custom Validation

TOPICS

3 Labs

Reactive Forms Setup and Data Flow · FormGroup, FormControl, FormArray · Custom Validators (sync & async) · Dynamic Forms and Validation Messaging

DAY 3 Advanced Routing and Navigation

TOPICS

3 Labs

- **RouterModule:** forRoot, forChild
- Lazy Loading Feature Modules
- **Route Guards:** CanActivate, CanDeactivate, Resolve
- Custom Preloading Strategies
- Route Reuse Strategies

DAY 4 RxJS Mastery and State Management Patterns

TOPICS

2 Labs

- Observable vs Subject vs BehaviorSubject
- Hot vs Cold Observables
- **Common Operators:** map, switchMap, mergeMap, concatMap, withLatestFrom
- Centralized vs Local Component State

DAY 5 State Management with NgRx

TOPICS

3 Labs

- **NgRx Concepts:** Store, Actions, Reducers, Selectors, Effects
- Handling Side Effects with Effects
- Entity Adapter and Entity State
- Debugging with NgRx DevTools

DAY 6 Angular Performance Optimization Techniques

TOPICS

3 Labs

- Lazy Loading, Code Splitting, Tree Shaking
- Using trackBy in *ngFor
- Pure vs Impure Pipes
- OnPush Strategy Recap
- Angular DevTools and Chrome Performance Profiler

DAY 7 Unit Testing and E2E Testing

TOPICS

3 Labs

Jasmine/Karma Basics · Testing Services and Components with Mocks · Testing Forms and Directives · E2E Testing with Cypress or Playwright · Test Strategies in Micro Frontends

DAY 8 Micro Frontends Introduction

TOPICS

3 Labs

- What are Micro Frontends (MFEs)?
- Monolith vs Micro Frontend Architecture
- **MFE Approaches:** iFrame, Web Components, Module Federation
- Use Cases, Pros, and Cons
- Communication Between MFEs

DAY 9 Angular Micro Frontends Using Module Federation

TOPICS

3 Labs

- Webpack 5 Module Federation Basics
- Setting up Angular CLI projects with Module Federation
- Host vs Remote Architecture
- Shared Libraries and Dependency Management
- Navigation and Routing Between MFEs

DAY 10 Build & Deploy Micro Frontends

TOPICS

2 Labs

Independent Builds and Deployment Pipelines · Runtime Integration of Remotes · Version Compatibility and Contracts · Deployment Strategies · Production Readiness Considerations

HANDS-ON LABS

Practise What You Learn

MODULE	ACTIVITY
Advanced Angular Architecture & Change Detection	■ **Create two components:** one with default and one with OnPush ■ Use NgZone.runOutsideAngular() to optimize a background task ■ Log change detection using console.log() in ngDoCheck
Reactive Forms and Custom Validation	■ Build a dynamic employee registration form ■ Add field-level and form-level custom validators ■ Implement async validator (e.g., check username availability)
Advanced Routing and Navigation	■ Lazy-load a feature module ■ Add auth guard and resolver to routes ■ Implement custom preloading logic to load modules based on metadata
RxJS Mastery and State Management Patterns	■ Build a real-time filter/search UI using RxJS operators ■ Create a shared service using BehaviorSubject for cross-component communication
State Management with NgRx	■ Create an Orders feature using NgRx (store setup + reducer logic) ■ Trigger API calls via effects and display data using selectors ■ Use NgRx DevTools to inspect state changes
Angular Performance Optimization Techniques	■ Analyze bundle sizes using ng build --stats-json + webpack-bundle-analyzer ■ Apply trackBy to improve *ngFor rendering ■ Convert impure pipes to pure and compare performance

MODULE	ACTIVITY
Unit Testing and E2E Testing	■ Write unit tests for service with mocked HTTP responses ■ Test a reactive form's validation ■ Create a Cypress test for user login flow
Micro Frontends Introduction	■ Create two standalone Angular apps ■ Load one app inside another via iFrame ■ Implement basic communication using postMessage
Angular Micro Frontends Using Module Federation	■ Create host and two remote Angular apps ■ Expose components and routes from remotes ■ Load components remotely and manage shared dependencies
Build & Deploy Micro Frontends	■ Containerize host and remotes using Docker ■ Deploy to local environment using Docker Compose

WHAT IS INCLUDED

Everything You Need to Succeed

- Koenig course material for every module
- Delivery by certified instructors and subject matter experts
- Hands-on exercises throughout the course
- Course completion certificate from Koenig

ABOUT KOENIG

Who We Are

Established in 1993, Koenig Solutions is a globally recognised training provider with 35+ technology partnerships, 5,000+ training programmes and a network of certified instructors and subject matter experts, supporting individuals and enterprise teams worldwide.

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