Advanced Angular with Micro Front End Development

Prerequisites: Knowledge of Angular Application Development

Day 1: Advanced Angular Architecture & Change Detection

Topics:

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

Lab:

- 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

Day 2: Reactive Forms and Custom Validation

Topics:

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

Lab:

- Build a dynamic employee registration form
- Add field-level and form-level custom validators
- Implement async validator (e.g., check username availability)

Day 3: Advanced Routing and Navigation

Topics:

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

Lab:

- Lazy-load a feature module
- Add auth guard and resolver to routes
- Implement custom preloading logic to load modules based on metadata

Day 4: RxJS Mastery and State Management Patterns

Topics:

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

Lab:

- Build a real-time filter/search UI using RxJS operators
- Create a shared service using BehaviorSubject for cross-component communication

Day 5: State Management with NgRx

Topics:

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

Lab:

- 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

Day 6: Angular Performance Optimization Techniques

Topics:

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

Lab:

- 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

Day 7: Unit Testing and E2E Testing

Topics:

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

Lab:

- Write unit tests for service with mocked HTTP responses
- Test a reactive form's validation
- Create a Cypress test for user login flow

Day 8: Micro Frontends Introduction

Topics:

- 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

Lab:

- Create two standalone Angular apps
- Load one app inside another via iFrame
- Implement basic communication using postMessage

Day 9: Angular Micro Frontends using Module Federation

Topics:

- 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

Lab:

- Create host and two remote Angular apps
- Expose components and routes from remotes
- Load components remotely and manage shared dependencies

Day 10: Build & Deploy Micro Frontends

Topics:

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

Lab:

- Containerize host and remotes using Docker
- Deploy to local environment using Docker Compose