

# Angular & TypeScript Coding Challenges (Beginner → Advanced)

## Stage 1 – Beginner (Core Angular & TypeScript)

- Challenge 1: Create a parent-child component setup using @Input and @Output.
- Challenge 2: Build a product list using \*ngFor and handle button click events.
- Challenge 3: Create a service that fetches data from <https://jsonplaceholder.typicode.com/posts>.
- Challenge 4: Write a generic TypeScript function that returns the first element of any array.
- Challenge 5: Log Angular lifecycle hooks in a component and explain the order.

## Stage 2 – Intermediate (Forms, Routing, RxJS)

- Challenge 6: Create a reactive login form with validation (email + password).
- Challenge 7: Implement routing with /users and /user/:id (lazy loading included).
- Challenge 8: Build a search box that uses debounceTime and switchMap to call an API.
- Challenge 9: Implement an HTTP interceptor to attach a fake JWT token.
- Challenge 10: Create an AuthGuard that blocks routes when user is not logged in.

## Stage 3 – Advanced (Change Detection, State, Testing)

- Challenge 11: Optimize a list of 1000 items with ChangeDetectionStrategy.OnPush and trackBy.
- Challenge 12: Build a counter app using NgRx (actions, reducer, selector).
- Challenge 13: Unit test a service that makes HTTP requests using HttpClientTestingModule.
- Challenge 14: Unit test a component with @Input and @Output properties.
- Challenge 15: Create a custom form validator for password strength.

## Stage 4 – Expert (Performance, Signals, Architecture)

- Challenge 16: Implement virtual scrolling using Angular CDK for a list of 1000+ items.
- Challenge 17: Convert a BehaviorSubject-based state management example to Angular Signals.
- Challenge 18: Create a shared module with reusable components, directives, and pipes.
- Challenge 19: Add environment configuration (dev/prod) and display API URL accordingly.
- Challenge 20: Design a task manager app with CRUD, auth, guards, and OnPush optimization.