

# Advanced Rust 2026 - Lab 4: Library API and Test Strategy

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## Lab Goals

1. Design public APIs with stable contracts.
2. Build layered tests (unit + integration + regression).
3. Prepare for homework pair A4.

## Time Plan (90 min)

1. 15 min - API review warm-up
2. 20 min - exercise 1 (error surface design)
3. 20 min - exercise 2 (golden-output tests)
4. 20 min - exercise 3 (property-style checks)
5. 15 min - review and migration notes

## Exercise 1: Error Surface

Given parser code with `‘anyhow::Error’` leaks, redesign it to:

1. Use domain enum errors.
2. Preserve useful source context.
3. Keep caller-facing API concise.

## Exercise 2: Golden Output Contract

Create formatter function and tests using fixed expected text files.

Constraints:

1. Stable ordering.
2. Exact formatting.
3. Deterministic behavior independent of hash map iteration.

## Exercise 3: Invariant Checks

Write test helpers asserting invariants:

1. parse + serialize roundtrip stability
2. stable sort order
3. clear behavior on empty input

## Debrief

1. Which API choices are semver-sensitive?
2. Which tests protect against accidental behavioral drift?