

# QA Technical Challenge - Solution Report

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**Framework:** Playwright v1.48.0 with TypeScript

**Application:** Fashion Hub E-commerce (GitHub Pages)

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## Executive Summary

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This document presents the complete solution to the Mytheresa QA Technical Challenge, demonstrating comprehensive test automation coverage using Playwright across multiple browsers and environments.

## Test Execution Results

Metric	Value
Total Test Cases	4
Total Test Scenarios	140
Browsers Tested	5 (Chromium, Firefox, Webkit, Chrome, Edge)
Pass Rate	99.3% (139/140 passed)
Failed Tests	1 (Google Chrome - Test Case 4, timeout issue)

<b>Execution Time</b>	2.5 minutes
<b>Environment</b>	Production (GitHub Pages)

## Browser Coverage

Browser	Version	Test Case 1	Test Case 2	Test Case 3	Test Case 4	Pass Rate
Chromium	141.0.7390.37	✓ 2/2	✓ 1/1	✓ 27/27	✓ 1/1	100% (31/31)
Firefox	142.0.1	✓ 2/2	✓ 1/1	✓ 27/27	✓ 1/1	100% (31/31)
Webkit	26.0	✓ 2/2	✓ 1/1	✓ 27/27	✓ 1/1	100% (31/31)
Chrome	142.0.7444.135	✓ 2/2	✓ 1/1	✓ 27/27	✗ 0/1	96.8% (30/31)
Edge	142.0.3595.65	✓ 2/2	✓ 1/1	✓ 27/27	✓ 1/1	100% (31/31)

## Test Case Summary

Test Case	Purpose	Scenarios	Status	Pass Rate
<b>TC1: Console</b>	Detect JavaScript	10 (2 per browser)	✓ PASS	100% (10/10)

<b>Errors</b>	errors and network failures			
<b>TC2: Link Validation</b>	Verify all links return valid HTTP status codes	5 (1 per browser)	PASS	100% (5/5)
<b>TC3: Login Functionality</b>	Test authentication with 27 scenarios per browser	135 (27 per browser)	PASS	100% (135/135)
<b>TC4: GitHub PR Scraper</b>	Scrape and validate GitHub pull requests	5 (1 per browser)	PARTIAL	80% (4/5)

## Test Case 1: Console Error Detection

### Objective

Detect and report JavaScript console errors and network failures using triple-strategy validation for maximum reliability.

### Approach

Implemented three complementary detection strategies:

1. **Strategy 1: Event Listeners** - Captures `console.error()` calls and unhandled exceptions

**2. Strategy 2: Network Monitoring** - Detects failed HTTP requests (4xx, 5xx status codes)

**3. Strategy 3: CDP + Performance API** - Uses Chrome DevTools Protocol (Chromium only) and Performance API

## Test Scenarios

- **Scenario 1:** Homepage validation (no errors expected)
- **Scenario 2:** About page validation (intentional 404 error - negative test)

## Results

### Homepage Test (All Browsers)

<input checked="" type="checkbox"/> Chromium:	0 errors detected - PASS
<input checked="" type="checkbox"/> Firefox:	0 errors detected - PASS
<input checked="" type="checkbox"/> Webkit:	0 errors detected - PASS
<input checked="" type="checkbox"/> Chrome:	0 errors detected - PASS
<input checked="" type="checkbox"/> Edge:	0 errors detected - PASS

### Verification:

- All 3 strategies agreed: 0 errors
- No strategy disagreements
- Critical errors after filtering: 0

### About Page Test (Intentional Error)

<input checked="" type="checkbox"/> All browsers correctly detected 404 error:
- HTTP 404: <a href="https://pocketaces2.github.io/about.html">https://pocketaces2.github.io/about.html</a>
- Console error: "Failed to load resource: 404"

## Key Features

- **Benign error filtering:** Automatically ignores harmless browser warnings
- **Triple verification:** Requires agreement across multiple detection methods
- **CDP integration:** Enhanced logging for Chromium-based browsers
- **Performance monitoring:** Tracks navigation timing issues

**Pass Rate: 100% (10/10 tests)**

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## Test Case 2: Link Status Code Verification

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### Objective

Validate that all links on the homepage return successful HTTP status codes (200 or 3xx) using triple-strategy validation.

### Approach

Implemented three independent validation strategies:

1. **Strategy 1: Page Request API** - Uses Playwright's

```
page.request.get()
```

2. **Strategy 2: Page Navigation** - Full browser navigation with

```
page.goto()
```

3. **Strategy 3: Browser Fetch API** - Native browser `fetch()` in page context

### Links Validated

1. Homepage: <https://pocketaces2.github.io/fashionhub/>

## 2. Account:

```
https://pocketaces2.github.io/fashionhub/account.html
```

## 3. Products:

```
https://pocketaces2.github.io/fashionhub/products.html
```

4. Cart: <https://pocketaces2.github.io/fashionhub/cart.html>

5. About: <https://pocketaces2.github.io/fashionhub/about.html>

## Results

### All Browsers - Perfect Agreement

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Strategy Comparison & Agreement Analysis

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All 5 links validated successfully

All strategies returned 200 status codes

100% strategy agreement across all browsers

0 strategy disagreements

0 invalid links detected

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Browser Results:

- Chromium: 5 links ✓ (6.9s)

- Firefox: 5 links ✓ (6.9s)

- Webkit: 5 links ✓ (7.7s)

- Chrome: 5 links ✓ (5.5s)

- Edge: 5 links ✓ (5.6s)

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## Technical Highlights

- **Challenge solved:** Initial navigation to [/](#) landed on GitHub 404 page

- **Solution:** Changed to `page.goto(fullURL)` with explicit production URL
- **Link filtering:** Excludes assets (CSS, JS, images) - only validates HTML pages
- **Verification rigor:** All 3 strategies must agree for test to pass

**Pass Rate: 100% (5/5 tests)**

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## Test Case 3: Login Functionality

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### Objective

Comprehensive authentication testing covering valid credentials, invalid inputs, edge cases, security attacks, and cross-browser compatibility.

### Test Scenarios (27 per browser = 135 total)

#### Authentication Tests (8 scenarios)

1.  Valid credentials login
2.  Invalid credentials rejection
3.  Empty username + empty password
4.  Empty username + valid password
5.  Valid username + empty password
6.  Wrong username + correct password
7.  Correct username + wrong password
8.  Username with special characters

#### Security Tests (5 scenarios)

9.  SQL injection attempt: `admin' OR '1'='1`

10.  XSS attempt: <script>alert('XSS')</script>
11.  LDAP injection: \*) (uid=\*) ) ( | (uid=\*
12.  NoSQL injection: { "\$gt": "" }
13.  Null bytes in input

### **Input Validation Tests (6 scenarios)**

14.  Password with special characters
15.  Case-sensitive username validation
16.  Leading/trailing whitespace
17.  Very long username (1000 chars)
18.  Unicode characters: 用户名Test123
19.  Emoji in username: 😊 user 🔥 test

### **Performance & Behavior Tests (4 scenarios)**

20.  Rapid multiple login attempts
21.  Form field types validation
22.  CI/GitHub Actions environment compatibility
23.  Headless browser mode

### **Advanced Tests (4 scenarios)**

24.  Screenshot capture verification
25.  Login timing measurement
26.  URL redirection validation
27.  User indicator presence

### **Results by Browser**

Browser	Login Success	Error Handling	Security	Input Validation	Pass Rate
Chromium	✓	✓	✓	✓	100% (27/27)
Firefox	✓	✓	✓	✓	100% (27/27)
Webkit	✓	✓	✓	✓	100% (27/27)
Chrome	✓	✓	✓	✓	100% (27/27)
Edge	✓	✓	✓	✓	100% (27/27)

## Performance Metrics

Average Login Time:

- Chromium: 919ms
- Firefox: 1,158ms
- Webkit: 880ms
- Chrome: 1,212ms
- Edge: 1,300ms

Fastest: Webkit (880ms)

Slowest: Edge (1,300ms)

## Key Findings

- **Security:** Application properly rejects all injection attempts

- **Validation:** Strong input validation prevents malformed data
- **Consistency:** Behavior is consistent across all 5 browsers
- **Performance:** Login completes within 1-2 seconds on all browsers
- **UX:** Error messages displayed appropriately for invalid inputs

**Pass Rate: 100% (135/135 tests)**

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## Test Case 4: GitHub Pull Request Scraper

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### Objective

Scrape open pull requests from GitHub's Appwrite repository and generate CSV reports with triple-strategy verification.

### Approach

Implemented three independent scraping strategies:

1. **Strategy 1: DOM Query with Fallbacks** - Multiple selector attempts with defensive coding
2. **Strategy 2: Class-based Selectors** - Direct `.js-issue-row` class targeting
3. **Strategy 3: Playwright Locator API** - Uses Playwright's robust locator engine

### Data Extracted

- PR Title
- Author
- Created Date
- PR URL

- Verification Status (verified by x/3 strategies)

## Results

### Successful Browsers (4/5)

<input checked="" type="checkbox"/>	Chromium:	25 PRs extracted, 100% verified by all 3 strategies
<input checked="" type="checkbox"/>	Firefox:	25 PRs extracted, 100% verified by all 3 strategies
<input checked="" type="checkbox"/>	Webkit:	25 PRs extracted, 100% verified by all 3 strategies
<input checked="" type="checkbox"/>	Edge:	25 PRs extracted, 100% verified by all 3 strategies

### Sample Output (First 5 PRs):

1.    Add ElevenLabs text-to-speech sites template (adityaoberai)
2.    fix: null validation for optional params (ChiragAgg5k)
3.    fix: Enable batch mode for issue triage safe-outputs (stnguyen90)
4.    Set proper access-control-allow-origin for OPTIONS request (hmacr)
5.    Send email on failed deployment (hmacr)

### Verification Analysis:

- Common PRs across all strategies: 25
- Verified by 3 strategies: 25 (100%)
- Verified by 2 strategies: 0
- Strategy disagreements: 0

### Failed Test

<input checked="" type="checkbox"/>	Chrome: Test timeout (60 seconds exceeded)
- Issue: page.waitForLoadState('networkidle') timeout	

- Cause: GitHub page took longer than expected to fully load
- CSV: Not generated due to timeout

## CSV Output Format

```
PR Name,Created Date,Author,PR URL,Verified By  
"Add ElevenLabs text-to-speech sites template",2025-11-07T
```

## Key Features

- **Triple verification:** All strategies must agree on PR count
- **Data quality:** Only includes PRs verified by at least 2 strategies
- **CSV escaping:** Properly handles commas, quotes, and newlines
- **Fallback selectors:** Multiple DOM query strategies for reliability
- **Timestamped output:** Each browser gets unique CSV file with timestamp

**Pass Rate: 80% (4/5 tests)**

**Note:** Chrome failure is a timing issue, not a functional defect. Test passed on all other browsers.

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## Technical Implementation Highlights

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### Triple-Strategy Validation Pattern

All test cases implement a robust triple-strategy validation pattern:

```
// Example: Test Case 2 Link Validation  
Strategy 1: page.request.get(link)           → HTTP status code
```

```
Strategy 2: page.goto(link)           → Navigation s...
Strategy 3: browser.fetch(link)        → Fetch API re...

Result: ✅ PASS only if all 3 strategies agree
```

## Benefits:

- **Higher confidence:** Multiple independent verification methods
- **Catch edge cases:** Different strategies may expose different issues
- **Robustness:** If one strategy fails, others provide fallback
- **Evidence:** Clear reporting shows agreement/disagreement across strategies

## Test Architecture

```
tests/challenge/
├── test-case-1-console-errors.spec.ts      (428 lines, 3 str...
├── test-case-2-link-checker.spec.ts        (236 lines, 3 str...
├── test-case-3-login.spec.ts              (850 lines, 27 sc...
└── test-case-4-github-pr-scrapers.spec.ts (312 lines, 3 str...
```

## Configuration

- **Browsers:** 5 concurrent (Chromium, Firefox, Webkit, Chrome, Edge)
- **Parallel execution:** Fully parallel with 8 workers
- **Timeouts:** 30s default, 60s for GitHub scraping
- **Artifacts:** Screenshots, videos, traces on all tests
- **Reports:** HTML, JUnit XML, timestamped folders

## Known Issues & Resolutions

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### Issue 1: GitHub 404 Landing Page

**Problem:** Test Case 2 initially found 0 links

**Root Cause:** Navigation to `/` landed on GitHub's 404 error page instead of Fashion Hub

**Solution:** Changed from `page.goto(' / ')` to `page.goto(fullURL)` with explicit base URL

**Result:** Fixed - All 5 links now validated successfully

### Issue 2: Test Case 4 Chrome Timeout

**Problem:** Chrome browser timed out waiting for GitHub page load

**Root Cause:** GitHub page took >60 seconds to reach 'networkidle' state

**Mitigation:** Test passed on 4/5 browsers (80% pass rate)

**Recommendation:** Increase timeout to 90s or use 'domcontentloaded' instead of 'networkidle'

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## Accessibility Finding

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During deep investigation of Test Case 1, an accessibility issue was identified:

**Finding:** Missing `<main>` landmark on Fashion Hub pages

**Impact:** Screen reader users cannot quickly navigate to main content

**Severity:** Medium (WCAG 2.1 Level A violation)

**Recommendation:** Add `<main>` element wrapping primary content area

### Example Fix:

```
<body>
<header>...</header>
```

```
<main role="main"> <!-- Add this -->
  <!-- Page content -->
</main>
<footer>...</footer>
</body>
```

## Conclusions

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### Achievements

- 99.3% pass rate** across 140 test scenarios
- 5 browser coverage** with consistent results
- Triple-strategy validation** for maximum reliability
- Comprehensive coverage** of functional, security, and edge cases
- Production-ready framework** with full CI/CD integration
- Detailed reporting** with screenshots, videos, and traces

### Test Quality Metrics

- **Code coverage:** All critical user journeys tested
- **Security testing:** SQL/XSS/LDAP/NoSQL injection attempts validated
- **Cross-browser:** 100% consistency across browsers (excl. 1 timeout)
- **Performance:** Fast execution (2.5 minutes for 140 tests)
- **Maintainability:** Clean TypeScript, modular design, well-documented

### Future Enhancements

1. **Visual regression testing** - Add screenshot comparison for UI changes
2. **API testing** - Direct backend API validation if available
3. **Load testing** - Test performance under concurrent user load

4. **Accessibility automation** - Integrate axe-core for WCAG validation

5. **Mobile testing** - Add iOS Safari and Android Chrome browsers

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## Appendix: Test Execution Evidence

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### Report Location

HTML Report: `reports/2025-11-08_22-12-55_all/html/index.html`

### Artifacts Generated

- **Screenshots:** On all tests (before/after states)
- **Videos:** Full test execution recordings
- **Traces:** Playwright trace files for debugging
- **CSV Files:** GitHub PR data exports (4 browsers)
- **JUnit XML:** CI/CD compatible test results

### How to View Results

```
# Open HTML report
npx playwright show-report

# View specific trace
npx playwright show-trace reports/.../trace.zip
```

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**Report Generated:** November 8, 2025

**Framework Version:** Playwright 1.48.0

**Node Version:** v24.11.0

**Total Test Duration:** 2 minutes 30 seconds