

Testing Documentation for E-Commerce Project

Introduction

This document provides an in-depth overview of the testing process conducted for the e-commerce application project. The purpose of testing is to ensure that the application functions correctly, is robust under different scenarios, and meets industry standards for performance, security, and usability. The testing process incorporates functional, non-functional, performance, and security testing to prepare the application for real-world deployment.

Testing Scope

The testing scope covers the following components of the application:

- **Product Listing:** Validation of product listing and filtering functionalities.
- **Search and Filters:** Ensure search results are accurate and filters work as intended.
- **Cart Operations:** Add, update, and remove items from the cart.
- **User Profile:** Verify user details and saved orders.
- **Responsive Design:** Test application layout across various devices and screen sizes.
- **Backend Integration:** Validate API responses and error handling mechanisms.
- **Performance:** Optimize load times and ensure smooth interactions.
- **Security:** Validate input sanitization and secure communication.

Test Case Summary

A total of 10 test cases were prepared and executed. Below is a summary of the test cases:

Test Case ID	Description	Status	Severity	Remarks
TC001	Validate product listing page	Passed	Low	Products displayed as expected
TC002	Test API error handling	Passed	Medium	Error messages displayed correctly
TC003	Validate cart operations	Passed	High	Cart functionality working as intended
TC004	Ensure responsiveness on mobile	Passed	Medium	Layout adjusts properly
TC005	Performance optimization	Passed	High	Lighthouse score: 90+
TC006	Security testing	Passed	High	No vulnerabilities found
TC007	Test user profile functionality	Passed	Low	User data loads correctly
TC008	Validate search and filters	Passed	Medium	Results are accurate

TC009	Test checkout process	Passed	High	Workflow is error-free
TC010	Cross-browser compatibility	Passed	Medium	Consistent across browsers

Detailed Testing Approach

1. Functional Testing

Objective: To validate that all core functionalities work as expected.

- **Steps:**
 - a. Navigate to the product listing page.
 - b. Validate the accuracy of product details (name, price, image).
 - c. Add items to the cart and verify cart updates.
 - d. Check individual product detail pages for correct routing.
- **Tools Used:** Cypress, React Testing Library.

2. Error Handling

Objective: To ensure the application handles API errors gracefully and provides fallback UI.

- **Steps:**
 - a. Simulate network failures using Postman.
 - b. Verify fallback messages like "Unable to load products. Please try again later."
- **Tools Used:** Postman, Browser DevTools.

3. Performance Testing

Objective: To optimize the application's speed and responsiveness.

- **Steps:**
 - a. Use Lighthouse to identify performance bottlenecks.
 - b. Compress large images using TinyPNG.
 - c. Minify CSS and JavaScript files.
- **Tools Used:** Lighthouse, TinyPNG.

4. Cross-Browser and Device Testing

Objective: To ensure consistent functionality and design across different browsers and devices.

- **Steps:**
 - a. Test on Chrome, Firefox, Safari, and Edge.
 - b. Use BrowserStack to simulate devices like iPhone and Android.
 - c. Manually test on a physical mobile device.
- **Tools Used:** BrowserStack, physical devices.

5. Security Testing

Objective: To identify and mitigate potential security vulnerabilities.

- **Steps:**
 - a. Test input fields for SQL injection and XSS attacks.
 - b. Validate API communication uses HTTPS.

c. Scan application using OWASP ZAP.

- **Tools Used:** OWASP ZAP, Burp Suite.

6. User Acceptance Testing (UAT)

Objective: To simulate real-world usage and validate end-user experience.

- **Steps:**
 - a. Perform common workflows like searching and checking out.
 - b. Collect feedback from peers.

Test Results and Observations

- **Product Listing:** Products displayed correctly, even with large datasets.
- **Error Handling:** All scenarios handled with user-friendly messages.
- **Performance:** Improved Lighthouse score from 75 to 92 after optimizations.
- **Cross-Browser Compatibility:** Consistent across Chrome, Firefox, Safari, and Edge.
- **Security:** No vulnerabilities detected in OWASP ZAP scan.

Challenges and Resolutions

1. **Challenge:** Slow initial load time due to unoptimized images.
 - **Resolution:** Compressed images and enabled lazy loading.
2. **Challenge:** API failures were not handled initially.
 - **Resolution:** Added try-catch blocks and fallback UI.
3. **Challenge:** Inconsistent rendering on older browsers.
 - **Resolution:** Used polyfills to ensure compatibility.

Conclusion

The testing process validated that the e-commerce application meets the required standards for functionality, performance, security, and user experience. All identified issues were resolved, and the application is ready for deployment.

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