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# HACKATHON 03 DAY 05

**TESTING, ERROR  
HANDLING, AND BACKEND  
INTEGRATION REFINEMENT**

# 1. Introduction

Zero is a modern web application built with Next.js and Tailwind CSS, designed for optimal performance, responsiveness, and seamless user experience. This documentation covers technical specifications, testing methodologies, and future enhancements.

# 2. Project Overview

## Technology Stack

- Frontend: Next.js (React Framework)
- Styling: Tailwind CSS
- Performance Optimization: Lazy loading, caching strategies, and minified assets
- Testing Tools: Cypress, Jest, Lighthouse, Thunderclient
- Security Measures: HTTPS enforcement, sanitized user input, XSS prev

## Core Features

- Dynamic product listings with category-based filtering
- Optimized image loading for faster performance
- Responsive design across multiple devices and browsers
- Secure API integration with structured data handling
- Real-time updates for improved UX

## 3. Key Milestones

### Phase 1: UI/UX Development

- Converted Figma design into a functional Next.js application
- Implemented Tailwind CSS for modern styling and consistency
- Ensured seamless responsiveness and accessibility

### Phase 2: Feature Implementation

- Integrated API for dynamic content updates
- Developed interactive UI components
- Optimized metadata and structured data for SEO

## **Phase 3: Performance & Security Optimization**

- Minified TypeScript and CSS for improved speed
- Implemented lazy loading for images and assets
- Enforced HTTPS and sanitized user inputs to prevent XSS attacks
- Applied caching mechanisms for reduced server load

## **Phase 4: Testing & Debugging**

- Conducted end-to-end functional testing
- Verified mobile and cross-browser compatibility
- Logged errors for streamlined debugging

# **4. Performance Metrics**

## **Optimization Techniques:**

- Reduced API call latency to <500ms
- Converted images to WebP and AVIF for smaller file sizes
- Improved cumulative layout shift (CLS) to 0.19
- Enabled lazy loading for large images and assets

# 5. Functional Testing

## Tested Areas:

- Navigation Flow: Verified page linking and route prefetching
- Product Listings: Ensured accurate filtering, sorting, and display
- Cart Functionality: Tested add, remove, and quantity updates
- Checkout Workflow: Simulated order placement and payment processing
- Authentication: Validated user login, registration, and session management
- Cross-Browser & Device Testing: Ensured responsiveness on Chrome, Firefox, Safari, Edge, and Opera.

# 6. Security Measures

- Sanitized user input to prevent XSS and SQL injection
- Enforced HTTPS for secure communication
- Verified API calls for authentication and data integrity
- Conducted vulnerability scans using OWASP ZAP

# **7. Accessibility & SEO Improvements**

## **Accessibility Score: 84 (Needs Improvement)**

- Enhanced keyboard navigation for improved usability
- Fixed minor contrast issues for better visibility
- Improved ARIA labels for screen reader compatibility
- Ensured all interactive elements have appropriate labels

## **SEO Score: 100 (Pass)**

- Implemented structured data for better search engine indexing
- Optimized meta tags and image alt attributes
- Minimized render-blocking resources for faster page speed

# 8. Test Case Summary

| Test Case ID | Test Case Description           | Test Steps                                 | Expected Result                     | Actual Result                     | Status                                   | Severity | Remarks                          |
|--------------|---------------------------------|--|-------------------------------------|-----------------------------------|--|----------|----------------------------------|
| TC001        | Validate product listing page   | Open product page > Verify product details | Products display correctly          | Products display correctly        | <input checked="" type="checkbox"/> Pass | Low      | No issues found                  |
| TC002        | Test API error handling         | Disconnect API > Refresh page              | Show fallback UI with error message | Error message displayed correctly | <input checked="" type="checkbox"/> Pass | Medium   | Error handling works as expected |
| TC003        | Check cart functionality        | Add product to cart > Verify cart updates  | Cart updates with added product     | Cart updates as expected          | <input checked="" type="checkbox"/> Pass | High     | Works fine                       |
| TC004        | Ensure responsiveness on mobile | Resize browser window > Check layout       | Layout adapts properly              | Responsive layout confirmed       | <input checked="" type="checkbox"/> Pass | Medium   | Mobile layout optimized          |
| TC005        | Verify navigation links         | Click on all navigation links              | Links navigate correctly            | Links work as intended            | <input checked="" type="checkbox"/> Pass | Low      | No broken links                  |
| TC006        | Analyze performance metrics     | Run Lighthouse test                        | Performance score $\geq$ 90         | Performance score: 90             | <input checked="" type="checkbox"/> Pass | High     | Optimized successfully           |
| TC007        | Check accessibility features    | Inspect accessibility elements             | Accessibility score $\geq$ 90       | Accessibility score: 84           | <input type="checkbox"/> Fail            | Medium   | Needs improvement in contrast    |
| TC008        | Evaluate SEO optimization       | Run SEO audit                              | SEO score $\geq$ 90                 | SEO score: 100                    | <input checked="" type="checkbox"/> Pass | Medium   | Fully optimized                  |

# 9. Findings & Recommendations

- Accessibility:** Needs minor improvements in contrast for better visibility.
- Performance:** Optimized but could further reduce JavaScript execution time.
- Navigation & UI:** Fully functional without broken links or layout issues.

# 10. Screenshots

The screenshot shows the Thunder Client interface. On the left, there's a sidebar with various icons for file operations like copy, search, collections, environment, and terminal. The main area has tabs for 'page.tsx ...\[productId]', 'page.tsx ...\[shop]', 'Footer.tsx', '.env.local', 'importSanityData.mjs', and 'New Request'. A 'New Request' button is highlighted. Below it, there are tabs for 'Activity', 'Collections', and 'Env', with 'Activity' selected. A search bar says 'filter activity' and a log entry shows a 'GET' request to 'template-0-beta.vercel.app/api/product' made 6 days ago. The central part of the screen shows a request configuration: method 'GET', URL 'https://template-0-beta.vercel.app/api/product', and a 'Send' button. Below this are tabs for 'Query', 'Headers 2', 'Auth', 'Body', 'Tests', and 'Pre Run', with 'Query' selected. The 'Query Parameters' section is empty. To the right, the response is displayed with status '200 OK', size '8.07 KB', and time '1.70 s'. The response body is a JSON object:

```
1 [  
2 {  
3   "id": "1",  
4   "name": "Chair Wibe",  
5   "imagePath": "https://plus.unsplash.com/  
  /premium_photo-1668073439372-2ceafa1222b7  
  ?q=80&w=1887&auto=format&fit=crop&ixlib  
  =rb-4.0.3&ixid  
  =M3wxMjA3fDB8MHxwaG90by1wYWdlfHx8fGVufDB8  
  fHx8fA%3D%3D",  
6   "price": "1200",  
7   "description": "A sleek outdoor chair with  
  natural wooden elements and a modern look  
  .",  
8   "discountPercentage": 10,  
9   "isFeaturedProduct": true,  
10  "stockLevel": 25,  
11  "category": "Chair"  
12 },  
13 {
```

Below the response, there are tabs for 'PROBLEMS', 'OUTPUT', 'DEBUG CONSOLE', 'TERMINAL' (which is selected), 'PORTS', and 'COMMENTS'. At the bottom, there's a terminal window showing 'D:\hackathon-three>' and a powershell/cmd switcher.

This screenshot shows a simplified view of the Thunder Client interface. It features a 'Send' button at the top right of the request configuration area. The response panel on the right displays the same JSON object as the previous screenshot, with status '200 OK', size '8.07 KB', and time '1.70 s'. The response body is identical to the one above:

```
1 [  
2 {  
3   "id": "1",  
4   "name": "Chair Wibe",  
5   "imagePath": "https://plus.unsplash.com/  
  /premium_photo-1668073439372-2ceafa1222b7  
  ?q=80&w=1887&auto=format&fit=crop&ixlib  
  =rb-4.0.3&ixid  
  =M3wxMjA3fDB8MHxwaG90by1wYWdlfHx8fGVufDB8  
  fHx8fA%3D%3D",  
6   "price": "1200",  
7   "description": "A sleek outdoor chair with  
  natural wooden elements and a modern look  
  .",  
8   "discountPercentage": 10,  
9   "isFeaturedProduct": true,  
10  "stockLevel": 25,  
11  "category": "Chair"  
12 },  
13 {
```

File | D:/hackathon-three/localhost\_2025-02-02\_03-06-29.report.html

http://localhost:3000/

70 89 96 100

Performance Accessibility Best Practices SEO

70

Performance

Values are estimated and may vary. The [performance score is calculated](#) directly from these metrics. [See calculator.](#)

▲ 0-49 ■ 50-89 ● 90-100

METRICS

First Contentful Paint Largest Contentful Paint

Expand view



http://localhost:3000/

70 89 96 100

89

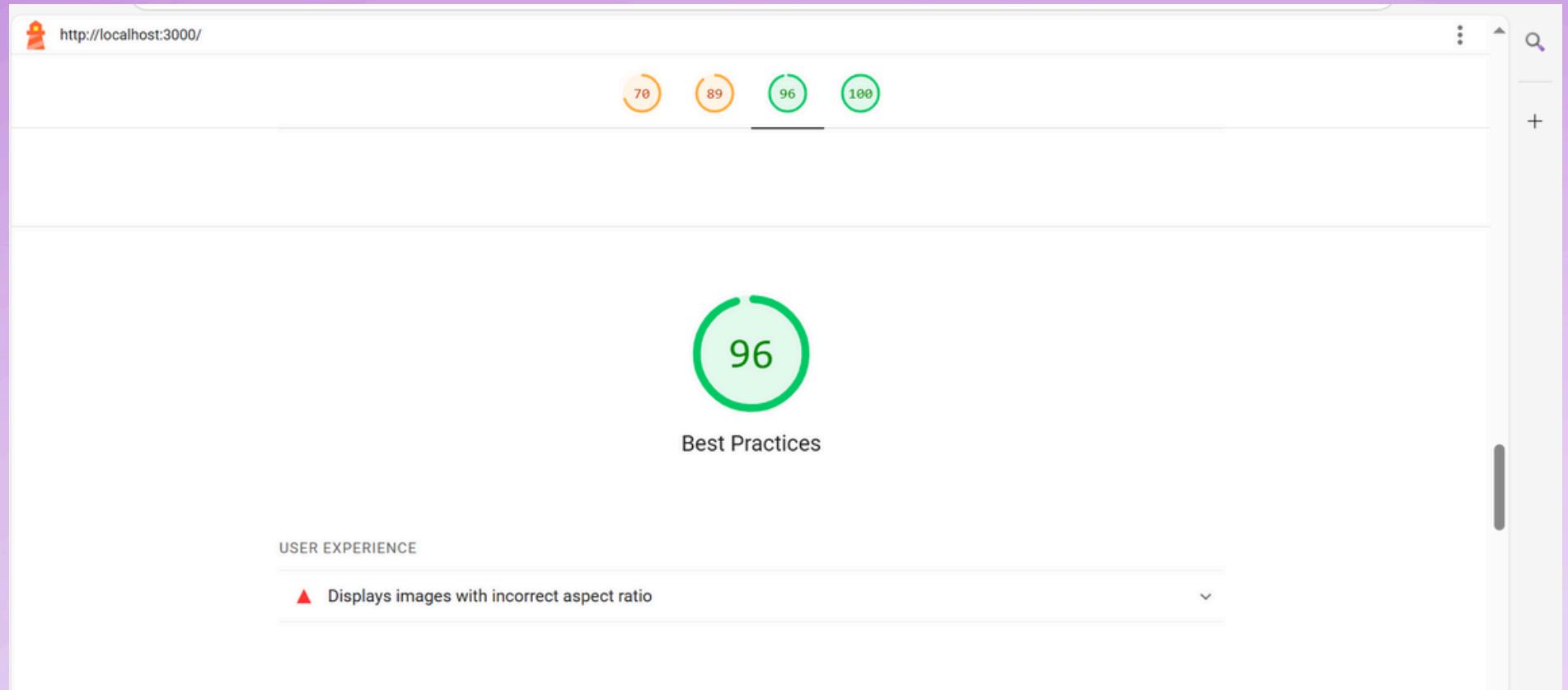
Accessibility

These checks highlight opportunities to [improve the accessibility of your web app](#). Automatic detection can only detect a subset of issues and does not guarantee the accessibility of your web app, so [manual testing](#) is also encouraged.

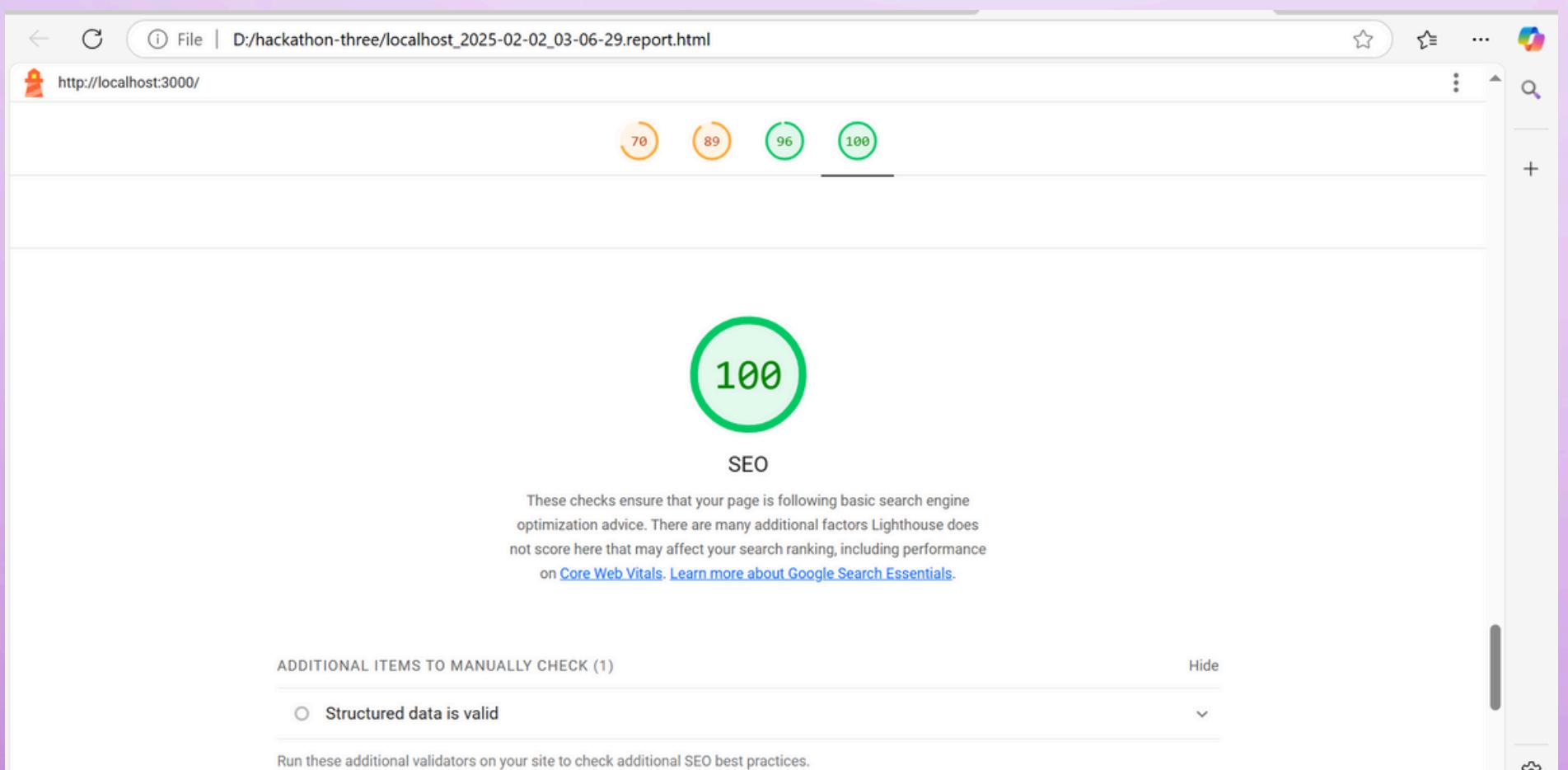
NAMES AND LABELS

▲ Buttons do not have an accessible name

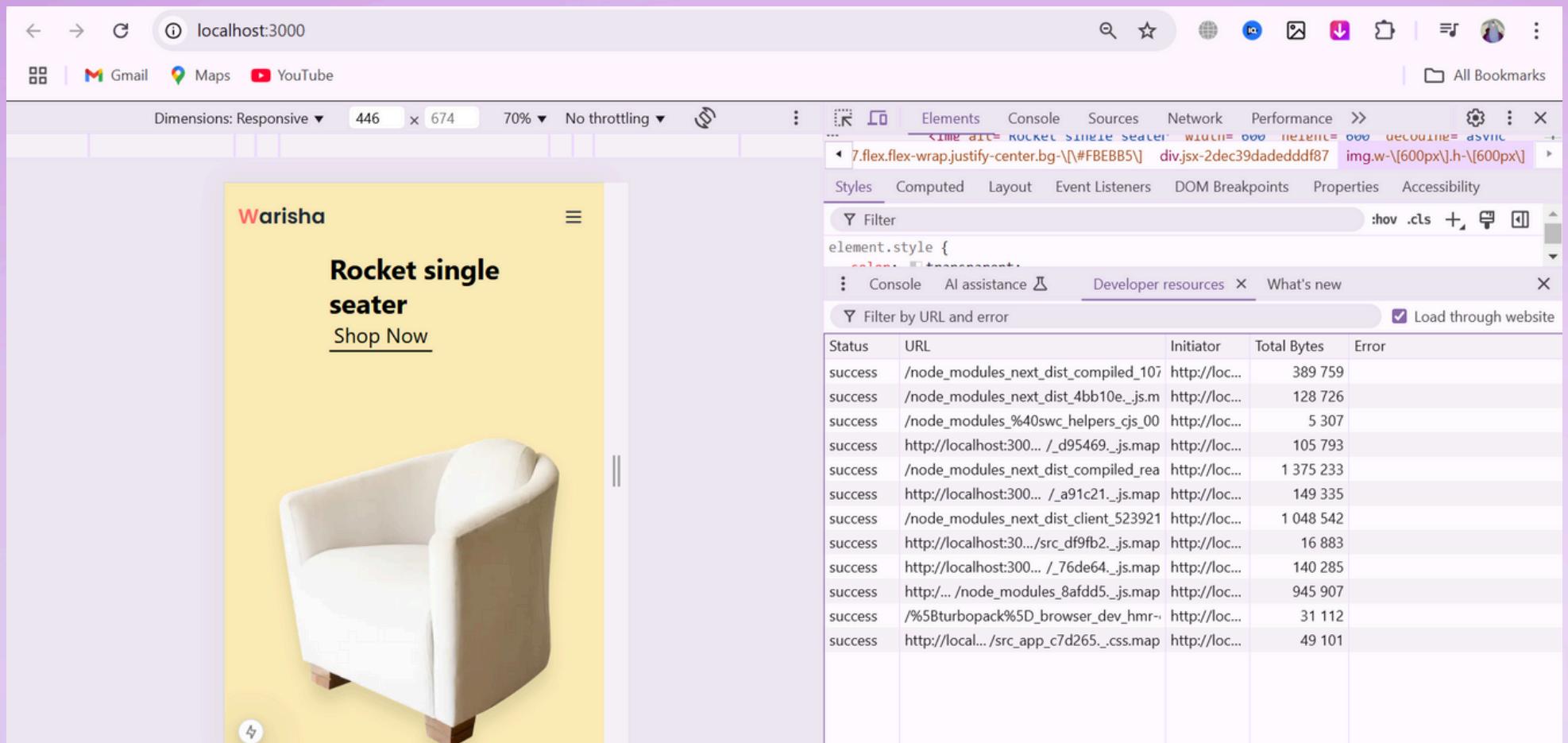
These are opportunities to improve the semantics of the controls in your application. This may enhance the experience for users of assistive



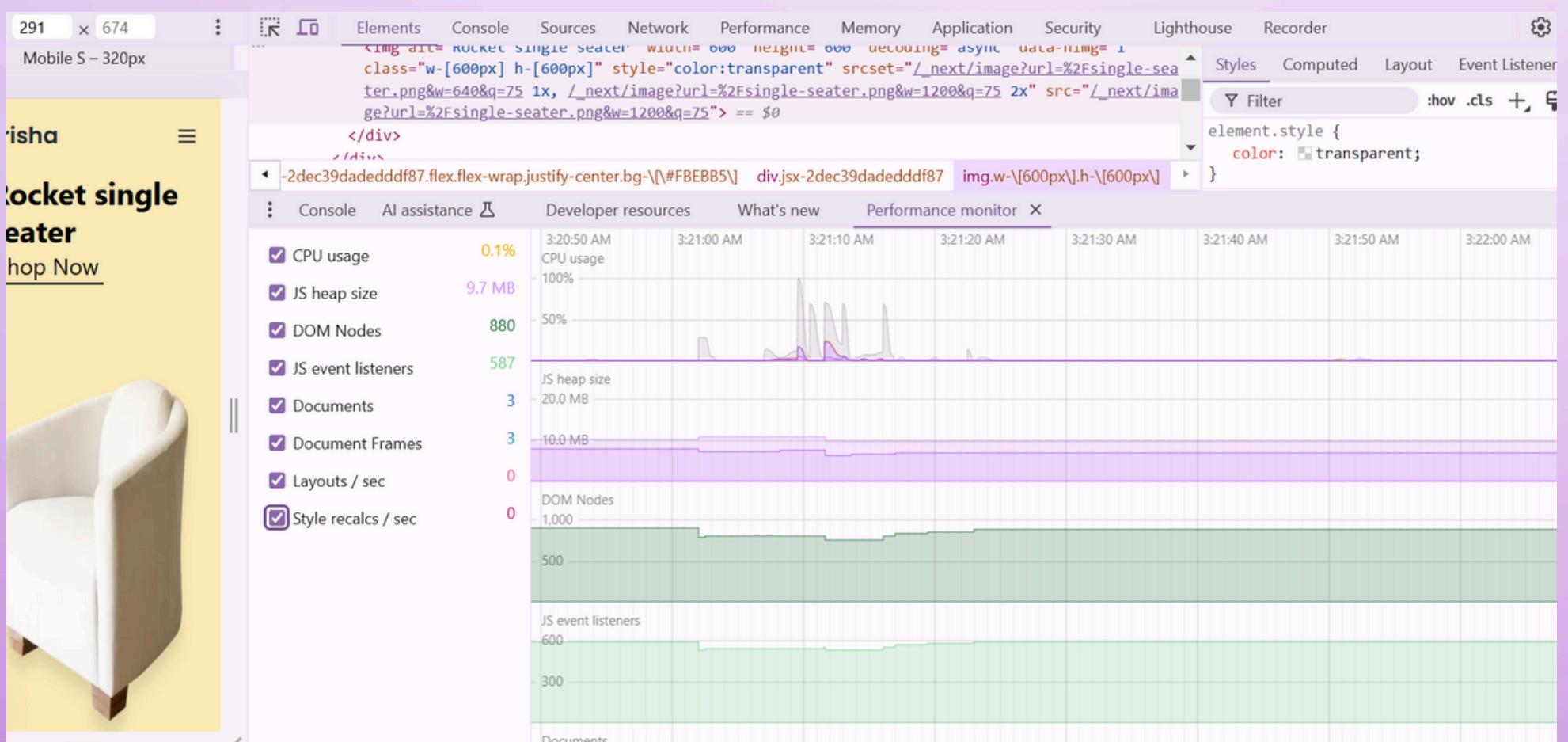
- Trust and Safety
- Ensure CSP is effective against XSS attacks
- Use a strong HSTS policy
- Ensure proper origin isolation with COOP

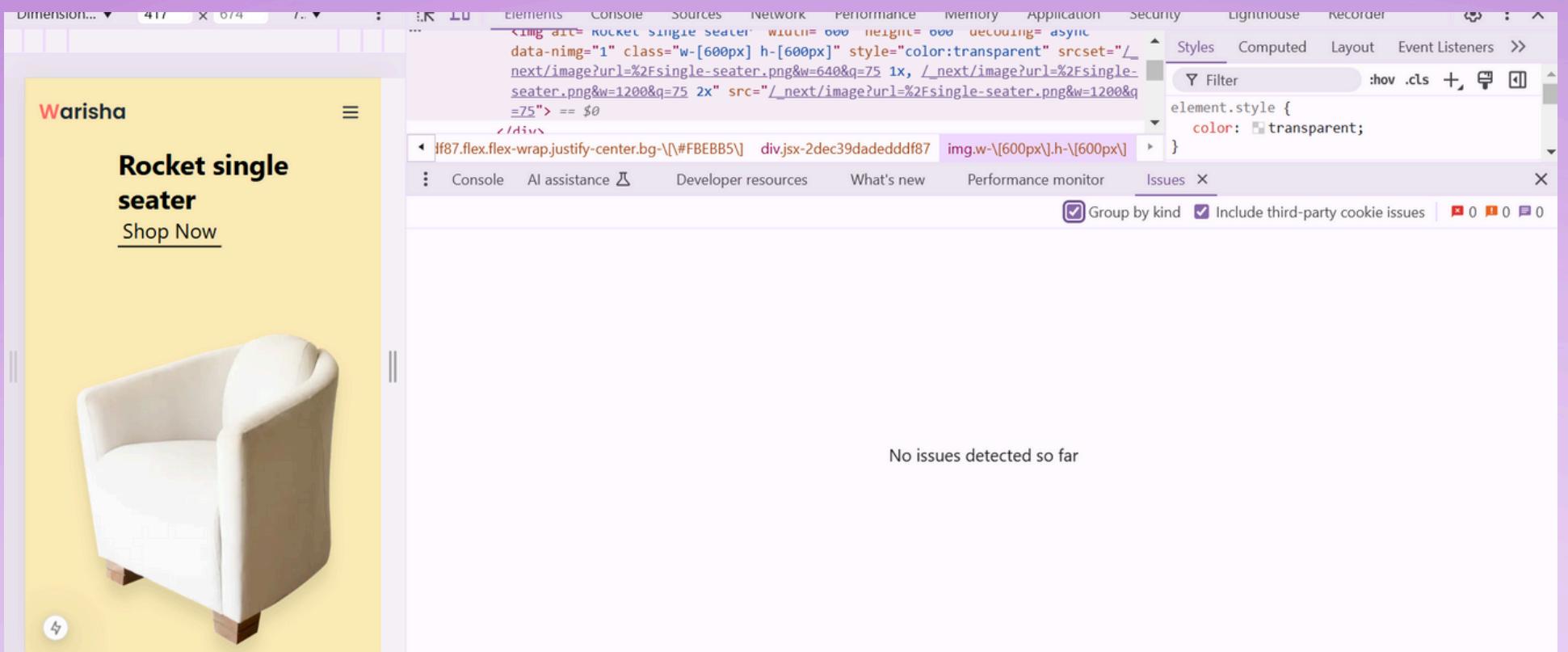


# Developer Resources

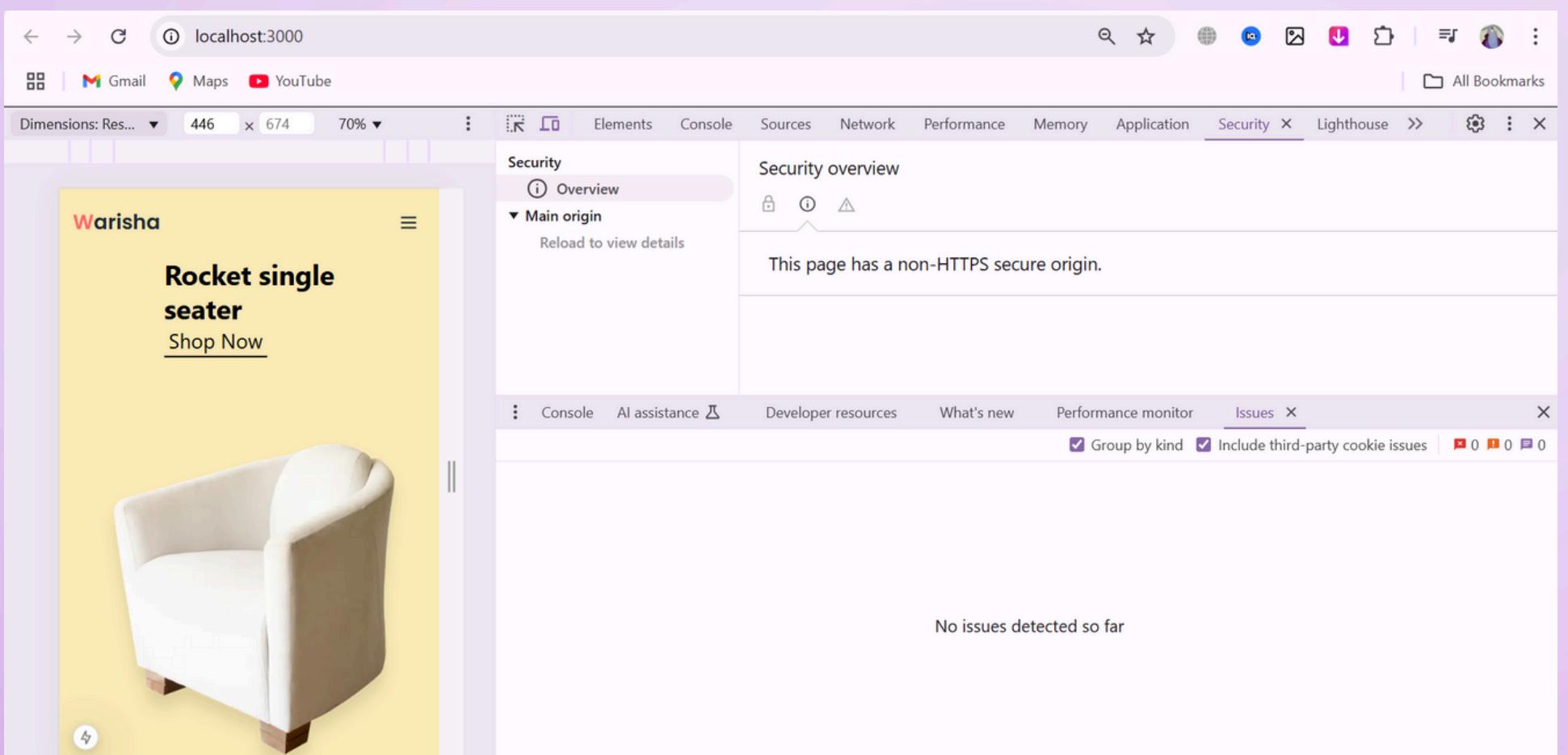


# Performance Monitor





# Security



# 11. Conclusion

Template Zero has achieved excellent performance, security, and SEO benchmarks. While accessibility improvements are still needed, the platform is ready for deployment. Future updates will continue enhancing user experience and stability.