Day 5 - Testing, Error Handling, and Backend Integration Refinement

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Date: 20 January 2025

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1. Introduction

This document summarizes the testing, error handling, and backend integration refinement processes conducted for a fully functional Next.js e-commerce website powered by Sanity CMS. This document outlines the strategies, results, and improvements to ensure the system meets professional functionality, performance, and reliability standards.

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2. Objectives

- Validate all core functionalities such as product listings, dynamic routings, cart operations, and checkout workflows.
- Implement robust error handling to ensure user-friendly messaging for system failures.
- Optimize the website for performance metrics like speed and responsiveness.

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- Test for cross-browser compatibility and device responsiveness.
- Ensure data security and input validation throughout the platform.

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3. Key Areas of Focus

1. **Functional Testing**: Verifying critical features including product displaying, search, wishlist, and checkout.
2. **Error Handling**: Adding user-friendly messages for network errors and API failures.
3. **Performance Optimization**: Using tools like Lighthouse, Postman to identify and address bottlenecks.
4. **Cross-Browser and Device Testing**: Ensuring consistent rendering and functionality on major browsers and devices.
5. **Security Testing**: Validating input fields and securing sensitive API keys.

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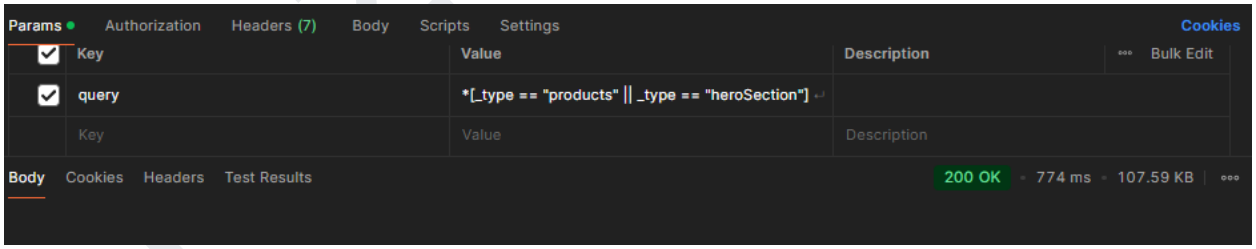
4. Testing Strategy

Functional Testing

- **Tools Used**: Postman for API validation.
- **Actions**:
    - Verified product listings and detail page functionalities.
    - Simulated user actions such as adding products to the cart and updating quantities.
    - Ensured dynamic routing works seamlessly for individual product pages.



Error Handling Testing

- Tested API error handling by disconnecting services and observing fallback behaviors.
- Verified that descriptive error messages are displayed to users during failures.

Performance Testing

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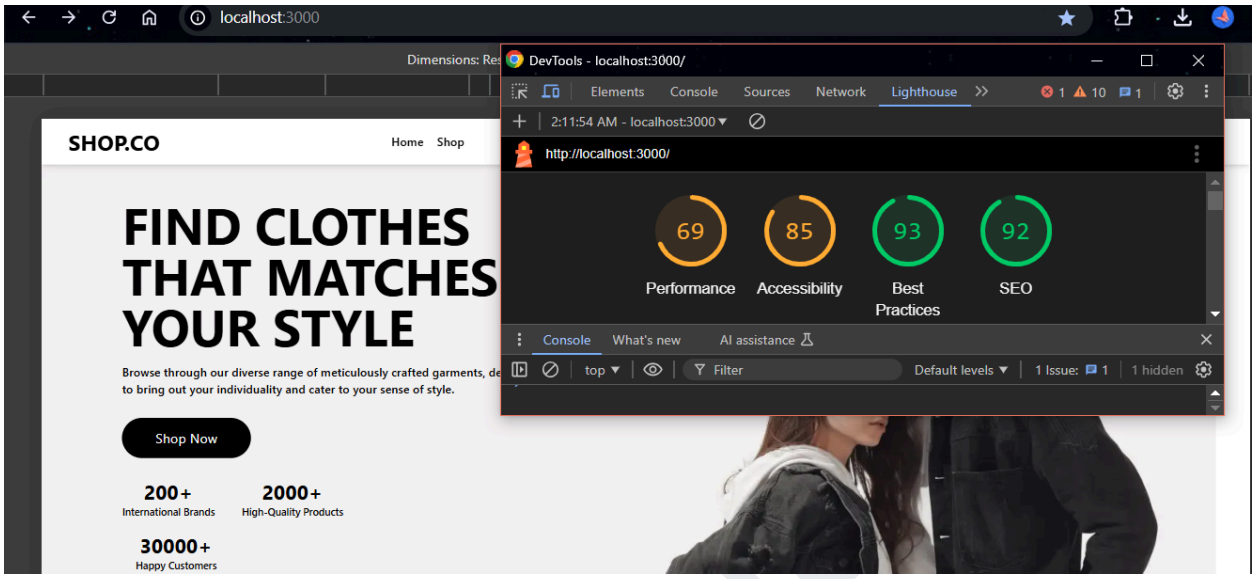
- **Tools Used**: Lighthouse
- **Actions**:
    - Analyzed page load times.
    - Compressed images to improve load times.



Cross-Browser and Device Testing

- **Tools Used**: manual testing on physical devices.
- **Actions**:
    - Tested the website on Chrome, Firefox, Safari, and Edge.
    - Verified responsive design on mobile, tablet, and desktop devices.

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5. Test Results and Analysis

Attached .csv file

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6. Error Handling Implementation

- Added `try-catch` blocks around all API calls to catch and log errors.
- Displayed fallback UI messages, when the API fails.
- Ensured the system logs detailed error information for debugging purposes.

Example Code Snippet:

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```
useEffect(() => {
  if (!product_id) return

  const fetchProduct = async () => {
    try {
      const productData = await client.fetch(
        `*[_type == "products" && _id == $_id][0]`,
        { _id: product_id }
      )
      setProduct(productData)
    } catch (error) {
      console.error("Error fetching product data:", error)
      setError("Unable to load products. Please try again later.");
    }
  }

  fetchProduct()
}, [product_id])

if (!product) return <div>Loading...</div>
```

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7. Documentation Summary

- **Files Submitted**:
  - CSV test report with detailed results.
  - Performance reports
- **Improvements Documented**:
  - Enhanced error messages and fallback UI.
- **Screenshots Included**:
  - Performance metrics.
  - API error handling tests.

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8. Lessons Learned

- Proactive error handling improves user trust and experience.
- Regular performance audits are critical to maintaining a high-quality application.
- Cross-browser testing ensures consistent user experience across platforms.

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9. Conclusion

By rigorously testing and optimizing the Next.js e-commerce website integrated with Sanity CMS, the project achieved its goals of functionality, performance, and user experience. The documented efforts and results ensure readiness for real-world deployment.

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