

HACKATHON DAY – 5

2025

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**Testing, Error Handling, and
Backend Integration
Refinement**

Hackathon Day - 5

Bandage Marketplace Template

Testing, Error Handling, and Backend Integration Refinement

Objective:

Prepare "My Marketplace" for real-world deployment by thoroughly testing, optimizing performance, and refining backend integrations. Ensure readiness to handle customer-facing traffic while delivering a seamless and error-free user experience.

Key Objective:

Comprehensive Testing: 1. Validate all features and backend integrations. 2. Ensure functional, non-functional, and user acceptance testing is completed. Error Handling: 1. Implement user-friendly error messages and fallback mechanisms. 2. Gracefully handle API errors with fallback UI elements. Performance Optimization: 1. Enhance speed, responsiveness, and reliability. 2. Conduct performance testing to identify and fix bottlenecks. Cross-Browser and Device Compatibility: 1. Test for seamless functionality across multiple browsers and devices. Security Testing: 1. Identify vulnerabilities and secure sensitive data. Documentation: 1. Create professional testing reports (CSV-based) summarizing results and resolutions. 2. Prepare deployment-ready documentation with best practices.

Key Learning Outcomes:

Comprehensive Testing:

1. Validate all features and backend integrations.
2. Ensure functional, non-functional, and user acceptance testing is completed.

Error Handling:

1. Implement user-friendly error messages and fallback mechanisms.
2. Gracefully handle API errors with fallback UI elements.

Performance Optimization:

1. Enhance speed, responsiveness, and reliability.
2. Conduct performance testing to identify and fix bottlenecks.

Cross-Browser and Device Compatibility:

1. Test for seamless functionality across multiple browsers and devices.
- Security Testing:
 1. Identify vulnerabilities and secure sensitive data.

Documentation:

1. Create professional testing reports (CSV-based) summarizing results and resolutions.
2. Prepare deployment-ready documentation with best practices.

Step 1: Functional Testing

Ensure the marketplace's key features operate as intended, delivering a smooth and error-free user experience.

Key Features to Test

Product Listing: Verify products are displayed accurately with proper details.

Product Details: Ensure product detail pages show correct information like price, description, images, and availability.

Category Filters: Test that filters return precise results based on user selection.

Dynamic Routing: Validate seamless navigation to individual product detail pages.

Add to Cart: Confirm items can be added, updated, and removed from the cart.

Add to Wishlist: Ensure products can be added to and managed in the wishlist.

Responsive Design: Validate that all features and pages adapt seamlessly to various screen sizes (mobile, tablet, and desktop).

User Profile Management: Check that users can update personal information, view order history, and manage saved addresses.

Step 2: Error Handling

Implement robust error handling mechanisms to ensure a smooth user experience, even when issues arise, by displaying clear and user-friendly fallback messages.

Key Areas to Address in Error Handling

Network Failures: Display a meaningful error message when there are connectivity issues.

Example: "Unable to connect to the server. Please check your internet connection."

Invalid or Missing Data: Handle cases where API responses return incomplete or invalid data.

Example: "Some information is missing. Please try again later."

Unexpected Server Errors: Use generic fallback messages for unhandled server-side errors.

Example: "Something went wrong on our end. Please try again later."

API Error Handling: Use try-catch blocks to gracefully manage API errors.

```
Tabnine | Edit | Test | Explain | Document
async function getData(): Promise<Product[]> {
  try {
    const fetchData = await client.fetch(`*[_type == "product"]{
      id,
      heading,
      subheading,
      image,
      price{
        originalPrice,
        discountedPrice
      },
    }`);
    return fetchData;
  } catch (error) {
    console.error("Error fetching data", error);
    return [];
  }
}
```

Fallback UI Elements:

Provide alternative content when data is unavailable.

Example: Display a "No products available" message or a placeholder image when the product list is empty.

```
if (loading) {
  return (
    <div className="flex justify-center items-center min-h-screen">
      <div
        className="w-16 h-16 border-4 border-blue-500 border-t-transparent rounded-full animate-spin"
        aria-label="Loading..."
      ></div>
    </div>
  );
}

if (!result) {
  return (
    <p
      className={` ${montserrat.className} text-center text-3xl font-semibold text-gray-800`
    >
      Product not found
    </p>
  );
}
```

Form Validation Errors:

Validate user inputs on both the frontend and backend to avoid invalid data submissions.

Example: Show specific error messages like "Email is required" or "Invalid phone number format."

```
// Validate email
if (!email) {
  isValid = false;
  errorMessages.email = "Email is required";
} else if (!/^\S+@\S+\.\S+$/.test(email)) {
  isValid = false;
  errorMessages.email = "Invalid email format";
}

// Validate password
if (!password) {
  isValid = false;
  errorMessages.password = "Password is required";
} else if (password.length < 6) {
  isValid = false;
  errorMessages.password = "Password must be at least 6 characters long";
}

setErrors(errorMessages);

if (isValid) {
  // Proceed with form submission (e.g., login)
  console.log("Form submitted successfully");
}
};
```

Step 3: Performance Optimization

Optimize the marketplace to improve load times, responsiveness, and overall performance. This step involves identifying bottlenecks and applying strategies to enhance the user experience.

Key Areas to Address

Optimize Assets:

Image Optimization: Compress images using tools like TinyPNG or ImageOptim to reduce size without losing quality.

Lazy Loading: Implement lazy loading for images and assets to defer loading until needed, improving initial load times.

Minimize JavaScript and CSS:

Minification: Minify JavaScript (using Terser) and CSS (using CSSNano) to reduce file sizes for faster loading.

Remove Unused Code: Eliminate unused CSS and JavaScript to further reduce file sizes.

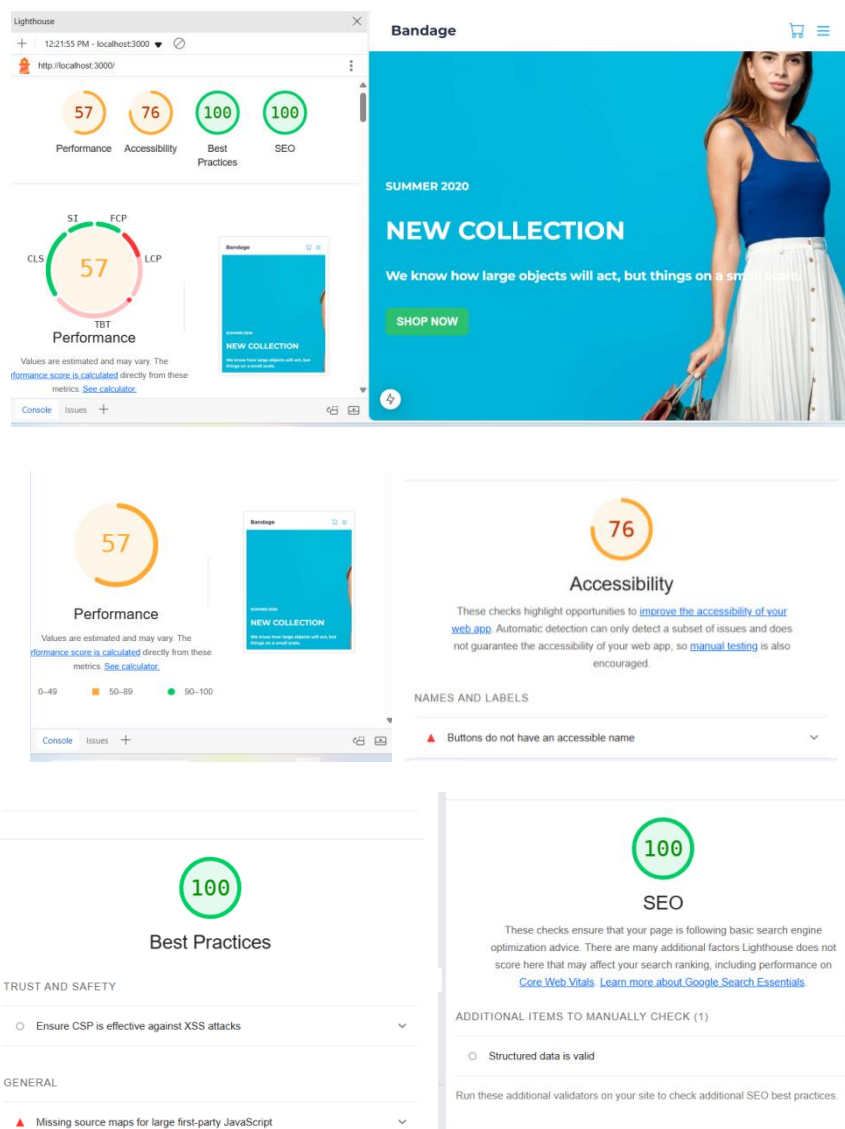
Implement Caching Strategies: Browser Caching: Store static assets in the user's browser to avoid repeated network requests.

Service Workers: Cache resources and improve offline functionality using service workers.

Analyze Performance: Google Lighthouse: Use Lighthouse to audit the website's performance and identify areas to improve, such as image optimization and resource loading.

WebPageTest & GTmetrix: Use these tools to identify performance bottlenecks and improve page load speeds.

Analyze Performance Tetsing



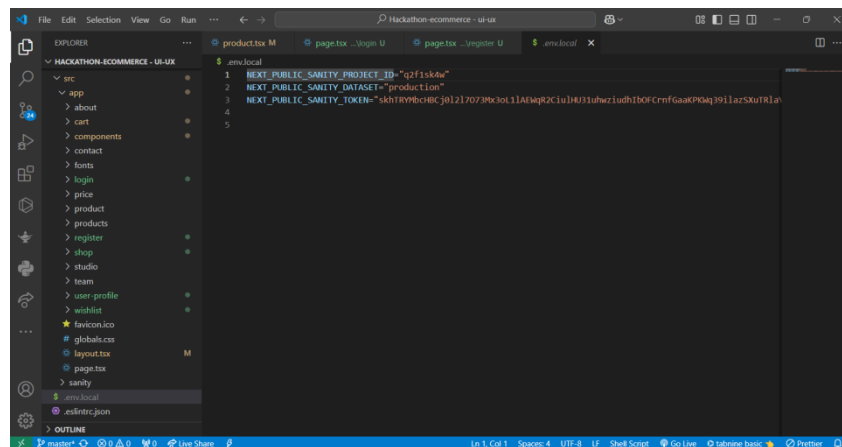
Step 5: Security Testing

Ensure the security of your marketplace by identifying vulnerabilities and implementing measures to protect sensitive data and prevent attacks.

Key Areas to Address

Input Validation: Sanitize all user inputs to prevent SQL injection, cross-site scripting (XSS), and other injection attacks. Use regular expressions to validate fields like email addresses, phone numbers, and other critical inputs.

Secure API Communication: Ensure all API calls are made over HTTPS to encrypt data in transit. Avoid exposing sensitive information, such as API keys, in the frontend code. Store them securely in environment variables.



Authentication & Authorization: Implement secure user authentication mechanisms like JWT (JSON Web Tokens) and OAuth. Ensure proper authorization checks are in place to restrict access to certain features or resources.

Cross-Site Request Forgery (CSRF) Protection: Implement anti-CSRF tokens to prevent unauthorized actions from being executed on behalf of an authenticated user.

Security Headers: Set HTTP security headers like Content-Security-Policy (CSP), X-Content-Type-Options, and Strict-Transport-Security (HSTS) to enhance security.

Vulnerability Scanning: Use tools like OWASP ZAP or Burp Suite to scan your marketplace for common security vulnerabilities and fix identified issues.

6. User Acceptance Testing (UAT)

Objective: Ensure that the marketplace meets user expectations and provides a seamless, intuitive experience before final deployment.

Key Areas to Address

Test the marketplace by performing typical user tasks, such as browsing products, searching, adding items to the cart, and completing a purchase. This will help identify usability issues and ensure that all features work as expected in real-world scenarios.

User Feedback: Involve peers, stakeholders, or potential users in testing to gather valuable feedback. This will help identify pain points or areas for improvement, ensuring the product meets user needs.

Usability Testing: Verify that the user interface is intuitive and easy to navigate. Ensure that all workflows, like signing up, logging in, and making a purchase, are straightforward and error-free.

Edge Cases: Test edge cases such as handling large product inventories, unusual search queries, and user interactions like failed transactions or login attempts to ensure the marketplace behaves as expected.

Device and Browser Compatibility: Confirm that the user experience remains consistent across different devices (desktop, tablet, mobile) and browsers (Chrome, Firefox, Safari, Edge). This ensures accessibility for all users.

CSV Format

```
Test Case ID,Test Case Description,Test Steps,Expected Result,Actual Result,Status,Severity Level,Assigned To,Remarks
TC001,Product Listing,Verify products on homepage,Products displayed correctly,Displayed correctly,Pass,High,Team A,No issues found
TC002,Product Details,Click on product,Product page loads,Loaded successfully,Pass,High,Team B,No issues found
TC003,Add to Cart,Click 'Add to Cart',Product added to cart,Added successfully,Pass,High,Team A,No issues found
TC004,Cart Operations,Add and remove items from cart,Cart updates correctly,Updated correctly,Pass,High,Team C,No issues found
TC005,Dynamic Routing,Click on product,Product page loads dynamically,Loaded correctly,Pass,Medium,Team B,No issues found
TC006,Category Filter,Apply filter,Products filtered correctly,Filtered correctly,Pass,Medium,Team C,No issues found
TC007>Error Handling (Network),Simulate network failure,Error message displayed,Message displayed,Pass,Critical,Team A,Handled correctly
TC008>Error Handling (Invalid Data),Enter invalid data,Error message displayed,Message displayed,Pass,High,Team A,Handled correctly
TC009,Responsive Design,Test on multiple devices,Responsive design works,Works on all devices,Pass,Medium,Team D,No issues found
```


CSV Table

Test Case ID	Test Case Description	Test Steps	Expected Result	
TC001	Product Listing	Verify that all products are displayed on the homepage.	All products should be displayed correctly.	
TC002	Product Details	Click on any product to view its details.	The product detail page should load correctly.	
TC003	Add to Cart	Click on 'Add to Cart' for a product.	Product should be added to the cart.	
TC004	Cart Operations	Add and remove items from the cart.	Cart should update correctly with the added/removed items.	
TC005	Dynamic Routing	Click on a product to navigate to its detail page.	The correct product detail page should load.	
TC006	Category Filter	Apply different category filters.	Products should be filtered based on selected category.	
TC007	Error Handling (Network)	Simulate a network failure and attempt to load a product.	An error message should be displayed, indicating a failure.	
TC008	Error Handling (Invalid Data)	Enter invalid data in a product search or form.	An appropriate error message should be displayed.	
TC009	Responsive Design	Test the website on multiple devices (desktop, tablet, mobile).	The design should adjust and be responsive on all devices.	
Actual Result		Status	Severity Level	Remarks
All products displayed as expected.		Pass	High	No issues found
Product detail page loaded without issues.		Pass	High	No issues found
Product added successfully to the cart.		Pass	High	No issues found
Cart updates correctly when items are added or removed.		Pass	High	No issues found
Correct page loaded with the right details.		Pass	Medium	No issues found
Products filtered correctly based on the selected category.		Pass	Medium	No issues found
Error message displayed as expected.		Pass	Critical	Error handling works as expected.
Error message displayed for invalid input.		Pass	High	Handled correctly with clear message.
Website design adapts correctly to various screen sizes.		Pass	Medium	No issues found on mobile/tablet.

Conclusion

Day 5 focused on preparing the marketplace for deployment by ensuring all components were thoroughly tested, optimized, and refined. Comprehensive functional, error handling, and performance tests were conducted, validating key features like product listing, cart operations, and dynamic routing. Robust error handling mechanisms and fallback UI elements were implemented to enhance reliability. Performance optimization efforts resulted in faster load times and improved responsiveness across devices and browsers. The team also documented all findings and resolutions in a professional format, ensuring readiness for real-world deployment.

