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

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Goal:

This session is dedicated to ensuring that our marketplace is fully tested, optimized, and ready for deployment. We focus on improving security, performance, and user experience through thorough testing and refinements.

Key Areas Covered:

1. **Functional Testing** - Ensuring all marketplace features work correctly, such as product listings and cart operations.
2. **Error Handling** - Implementing strategies to manage failures and maintain a smooth user experience.
3. **Performance Optimization** - Reducing load times and enhancing efficiency.
4. **Cross-Browser Compatibility** - Guaranteeing consistent behavior across different devices and browsers.
5. **Security Measures** - Implementing best practices to prevent vulnerabilities.
6. **Documentation and Reporting** - Maintaining a structured record of tests and their outcomes.

Functional Testing

Purpose:

Functional testing ensures that all essential marketplace operations work correctly and as expected. This includes product listings, search functionalities, cart operations, and the checkout process.

Testing Tools & Their Roles:

- **React Testing Library**: Used for unit testing UI components, verifying they render and behave correctly.
- **Cypress**: Enables automated end-to-end testing, simulating user actions across workflows.

Implementation Process:

1. Define test cases covering core functionalities.
2. Execute automated and manual tests, tracking expected vs. actual results.
3. Document any issues and refine features accordingly.

Error Handling

Why is Error Handling Important?

Errors can arise from various sources, such as:

- **Network failures** – Unstable internet connections affecting API calls.
- **Invalid data input** – Users entering incorrect or incomplete information.
- **Server-side issues** – Unexpected failures in backend operations.

Implementation Strategies:

- Use `try-catch` blocks to catch API failures and prevent application crashes.
- Provide clear, user-friendly error messages instead of vague system errors.
- Implement fallback UI elements to handle missing or delayed data.

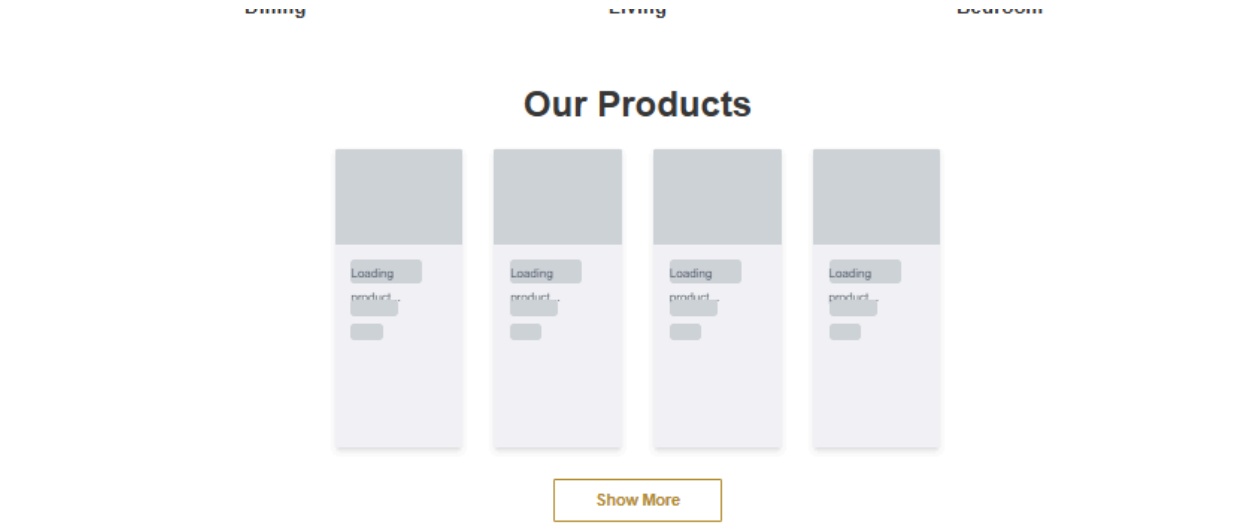
Example Code:

```
try {
      const fetchedProducts = await fetchProducts();
      setProducts(fetchedProducts);
      // console.log("Fetched Products:", fetchedProducts);
      setError(null);
    } catch (err) {
      setError(
        err instanceof Error ? err.message : "Failed to load products"
      );
    } finally {
      setIsLoading(false);
    }
```

Snippet:

```
      isLoading? Array.from({ length: 4 }).map((_, index) => (
            <div
              key={index}
              className="relative flex flex-col w-[250px] sm:w-auto
h-[300px] bg-gray-100 rounded-sm shadow-md overflow-hidden sm:mx-10
md:mx-2 lg:mx-0 animate-pulse"
            >
              <div className="relative w-full h-0 pb-[75%]
bg-gray-300"></div>
              <div className="flex flex-col gap-2 p-4">
                <div className="h-6 bg-gray-300 rounded w-3/4 mb-2">
                  <span className="text-gray-600 text-xs">
                    Loading product...
                  </span>
                </div>
                <div className="h-4 bg-gray-300 rounded w-1/2"></div>
                <div className="h-4 bg-gray-300 rounded w-1/3"></div>
              </div>
            </div>
          ))
```

UI:



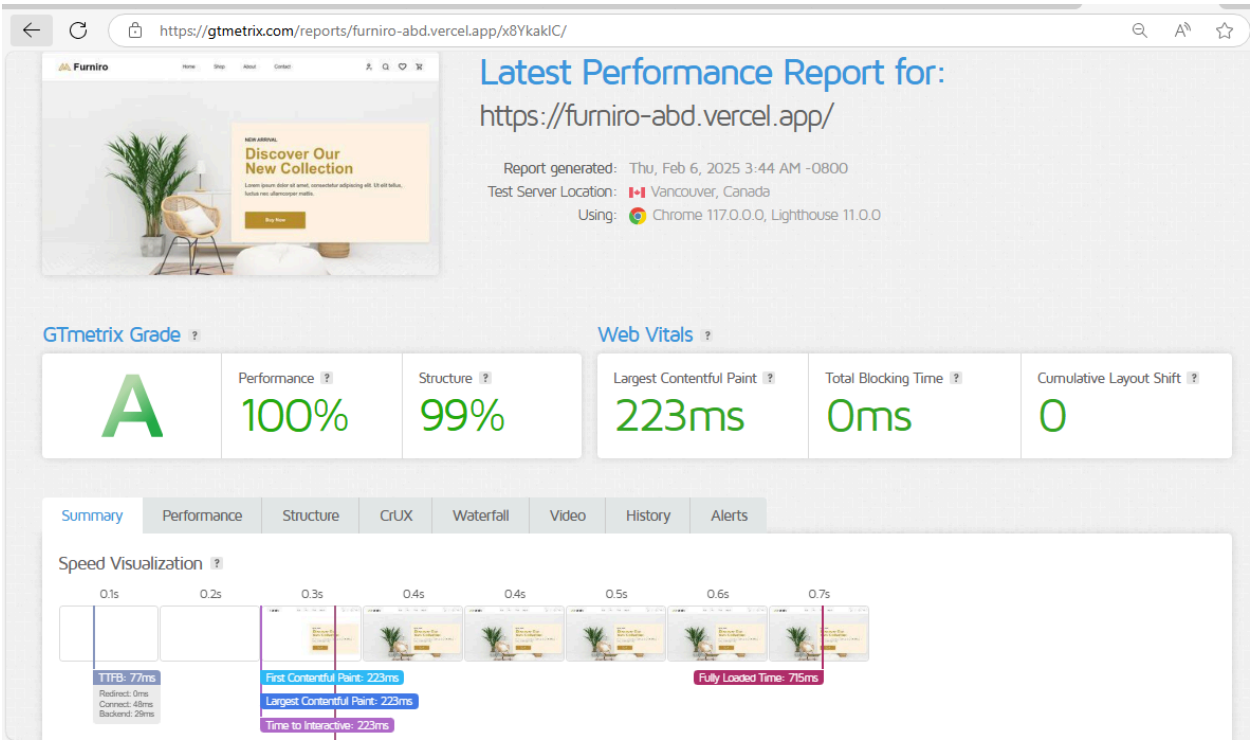
Performance Optimization

Objective:

Optimizing the marketplace for fast loading times and seamless user interactions.

Optimization Techniques & Tools:

1. **Analyze Performance:**
    - Use **Lighthouse** and **GTmetrix** to identify slow components.
2. **Reduce Load Time:**
    - Minify **JavaScript & CSS** to remove unnecessary code.
    - Enable **browser caching** to store frequently accessed resources locally.



(improving time to time)

Cross-Browser & Device Testing

Why is this Necessary?

Different browsers and devices interpret code differently, which can lead to inconsistencies in UI and functionality.

Testing Approaches & Tools:

- The website is working on **Chrome, Firefox, Safari, and Edge**.
- Use **BrowserStack** to simulate different devices and screen sizes.
- Validate responsiveness using **CSS media queries**.

Security Testing

Key Security Measures:

1. **Prevent Injection Attacks:**
    - Sanitize and validate user inputs to prevent malicious code execution.
2. **Secure API Communication:**
    - Use **HTTPS** for encrypted data transmission.
3. **Protect Sensitive Data:**
    - Store API keys in **environment variables** instead of exposing them in the code.

Tools Used for Security Testing:

- **OWASP ZAP** – Automated security scans to identify vulnerabilities.
- **Burp Suite** – Performs in-depth penetration testing.

User Acceptance Testing (UAT)

Purpose:

User Acceptance Testing (UAT) ensures the platform is ready for real-world usage by simulating user interactions.

Implementation Process:

1. Create a detailed **UAT checklist** covering all major functionalities.
2. Have actual users or testers **interact with the system** and provide feedback.
3. Address usability concerns based on findings and refine the experience.
