System Performance Report

Introduction

This report represents the results of a system performance test conducted on the library management system prototype using **Google Lighthouse**. The goal was to measure performance, identify bottlenecks, and suggest improvements to enhance speed and user experience.
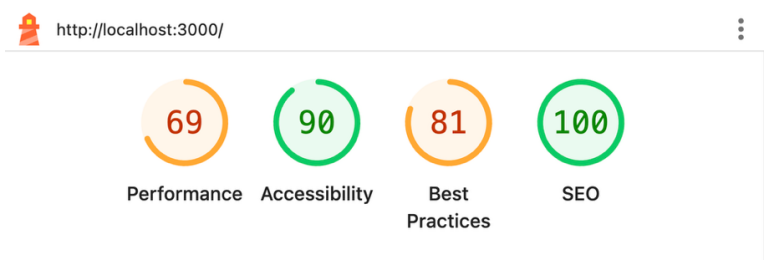
Objectives

- Evaluate page load speed and responsiveness.
- Identify performance, accessibility, and best practice issues.
- Provide actionable recommendations based on Lighthouse metrics.

Methodology:

- **Test Environment:** MacBook Pro, Apple Silicon (M1), RAM 16GB, Google Chrome Version 142.0.7444.176 (Official Build) (arm64)
- **Tool Used:** Google Lighthouse
- **Metrics Measured:**
    - **Performance:** First Contentful Paint (FCP), Largest Contentful Paint (LCP), Time to Interactive (TTI), Total Blocking Time (TBT), Cumulative Layout Shift (CLS)
    - **Accessibility:** ARIA labels, color contrast, and focus management
    - **Best Practice & SEO:** HTTPS, image optimization, meta tags

Lighthouse Results

Metric	Score / Value	Notes
Performance	69 / 100	LCP was slightly high due to large images
First Contentful Paint (FCP)	0.2 s	Excellent
Largest Contentful Paint (LCP)	6.0 s	Needs optimization (image compression)
Speed Index	0.9 s	Excellent
Total Blocking Time (TBT)	210 ms	Within limits
Cumulative Layout Shift (CLS)	0.035	Excellent
Accessibility	90 / 100	Missing some ARIA labels for buttons
Best Practices	81 / 100	Minor HTTPS warnings
SEO	100 / 100	Excellent

http://localhost:3000/

69 Performance   90 Accessibility   81 Best Practices   100 SEO

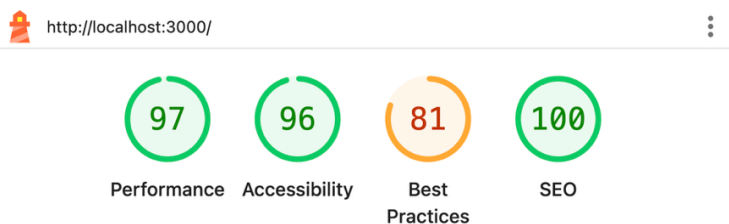METRICS   Expand view

● First Contentful Paint   ▲ Largest Contentful Paint
0.2 s   6.0 s

■ Total Blocking Time   ● Cumulative Layout Shift
210 ms   0.035

● Speed Index
0.9 s

Analysis

- Performance is mostly good, but LCP can be improved by optimizing images and scripts.
- Accessibility is high, but some buttons lack ARIA labels (e.g., icon-only buttons).
- Best practices score is 81/100, Best Practices score is 81/100, indicating minor issues such as the use of deprecated APIs and missing source maps for large JavaScript files. These issues affect maintainability and future compatibility.
- SEO is excellent at 100/100, so no immediate action is needed.

Recommendations

- **Optimize images:** compress or use modern formats like WebP to reduce LCP.
- **Add ARIA labels** for icon-only buttons to improve accessibility.
- **Fix minor Best Practices issues**: ensure HTTPS is fully enforced, check for outdated libraries, and follow security recommendations from Lighthouse.
- **Defer non-critical JS** or use code-splitting to reduce TTI.
- **Monitor Lighthouse scores regularly** to track improvements after changes.

http://localhost:3000/   ⋮

97   96   81   100
Performance Accessibility Best   SEO
                          Practices

METRICS   Expand view

● First Contentful Paint   ● Largest Contentful Paint
0.2 s   0.7 s

● Total Blocking Time   ● Cumulative Layout Shift
150 ms   0.038

● Speed Index
0.8 s

Conclusion

The library management system prototype performs well according to Lighthouse metrics. Implementing the above recommendations will improve page speed, accessibility, and user experience, ensuring the system is fast and user-friendly.