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EXPERIMENT 11

Aim: To use google Lighthouse PWA Analysis Tool to test the PWA functioning.

Theory:
Google Lighthouse is an open-source, automated tool used for improving the quality of web pages. It provides developers with audits for performance, accessibility, SEO, and best practices, helping them identify and fix issues that could impact user experience or page ranking in search engines. Google Lighthouse is commonly used by web developers to ensure that their websites meet the best standards for loading speed, usability, and search engine optimization.

The tool runs a series of audits on a webpage and generates a report that gives detailed insights into how the page performs in various categories. The key metrics that Lighthouse evaluates include:

Performance: This measures how fast a page loads and responds to user interactions. Metrics such as First Contentful Paint (FCP), Speed Index, Time to Interactive (TTI), and Total Blocking Time (TBT) are tracked to gauge loading speed.

Accessibility: Lighthouse checks how accessible a webpage is to people with disabilities. This includes testing color contrast, keyboard navigation, screen reader support, and other essential elements for an inclusive web experience.

SEO (Search Engine Optimization): It evaluates how well the webpage is optimized for search engines. This includes checking the use of proper HTML tags, metadata, and other aspects that help search engines understand and index the page better.

Best Practices: Lighthouse assesses whether the webpage adheres to modern web development practices, such as using HTTPS, avoiding deprecated APIs, and ensuring the page is safe and secure for users.

Progressive Web App (PWA): For websites that aim to function like native apps, Lighthouse evaluates how well they follow the principles of Progressive Web Apps, including offline capabilities, responsiveness, and installability.

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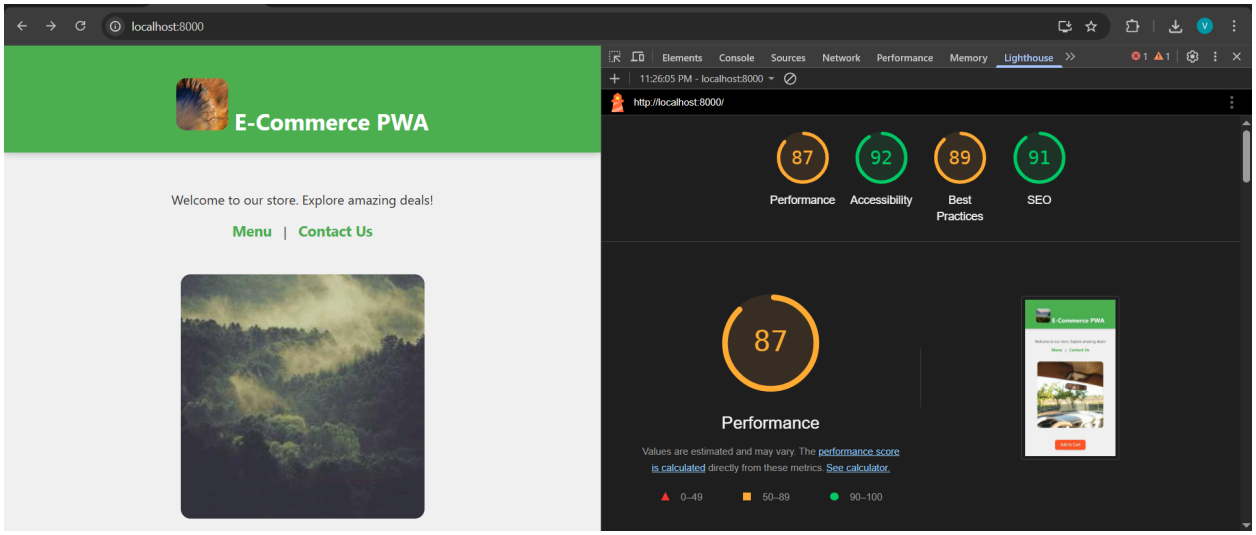
Output:

The Lighthouse report provides valuable insights into the PWA functionality:

1. Service Worker Implementation: Verifies proper registration and functionality
2. Offline Capabilities: Confirms the application works without an internet connection
3. App Manifest: Validates presence and correctness of the web app manifest
4. Loading Performance: Identifies opportunities for optimization
5. Responsive Design: Ensures the application works well across devices



Performance (87): The web application loads efficiently with good responsiveness. Minor improvements in loading speed or render-blocking resources could enhance overall performance.

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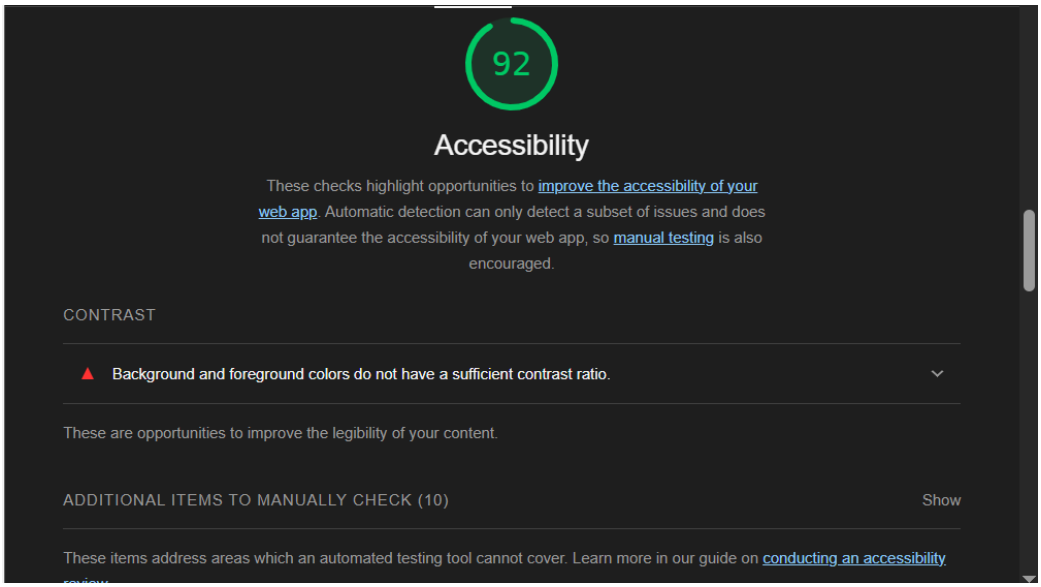
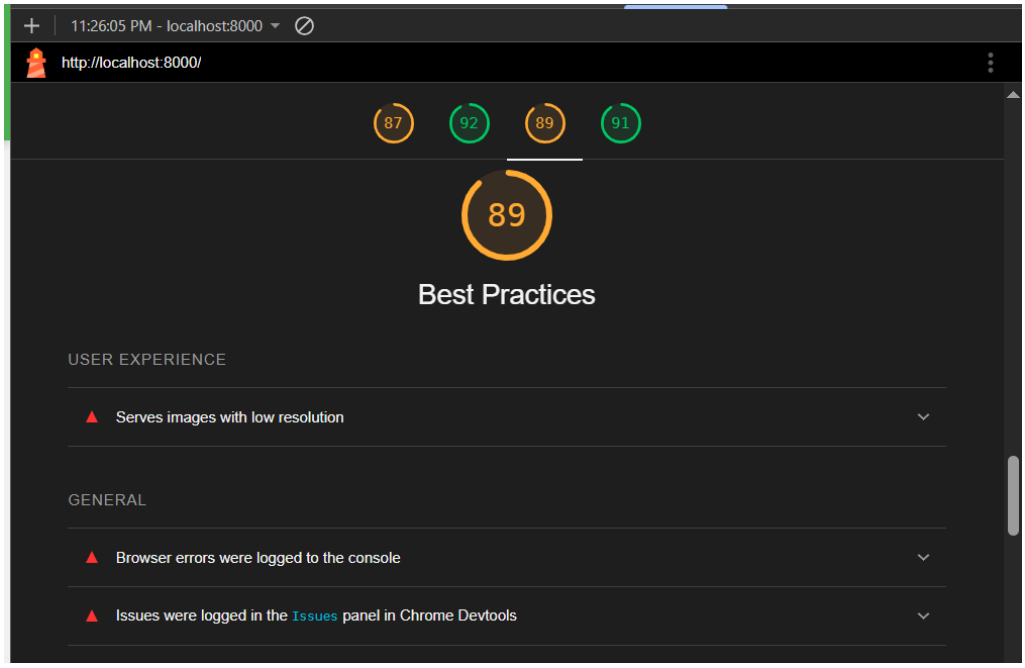


Accessibility (92): The application is largely accessible, supporting screen readers and keyboard navigation. A few enhancements could ensure full compliance with accessibility standards.



Best Practices (89): Some aspects of web development best practices are not fully met. Given, resolution of images.

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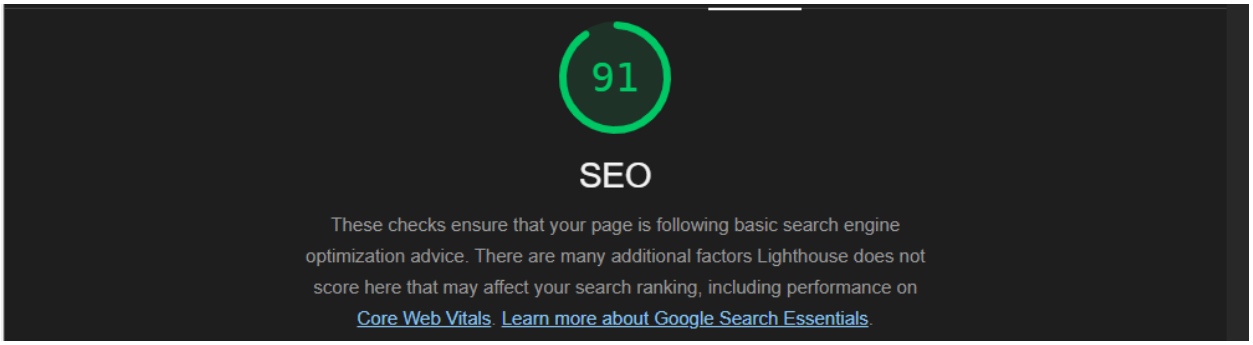

SEO (91): The website is well-structured and discoverable by search engines. Minor improvements such as meta tag refinements or improved link structure could raise the score further.

Conclusion:
The Progressive Web App was successfully tested using Google Lighthouse. The results show strong performance in key areas such as accessibility, SEO, and overall performance, with minor improvements needed in best practices. This confirms that the application meets core PWA standards and functions reliably across modern devices.