

Aim: The aim of the experiment is to use **Google Lighthouse PWA (Progressive Web App) Analysis Tool** to test how well a Progressive Web App works. **PWA** is a type of web app that behaves like a native mobile app, with features like offline access, push notifications, and fast performance.

Theory:

Google Lighthouse is a free, automated tool developed by Google that helps you test the quality of web pages. It provides insights into performance, accessibility, SEO (Search Engine Optimization), and more.

When we use Lighthouse for PWA analysis, it helps us check:

1. Performance: How Fast the PWA Loads and Responds

Performance measures how quickly your app loads and becomes interactive. A fast PWA ensures a better user experience, especially on mobile devices, reducing bounce rates and improving engagement.

2. Accessibility: How Easy it is for Everyone to Use the PWA, Including People with Disabilities

Accessibility ensures that your PWA is usable by everyone, including those with disabilities. This includes features like screen reader compatibility, keyboard navigation, and readable text contrast.

3. Best Practices: Whether the App Follows Recommended Web Development Guidelines

Best practices check if the app follows modern security and performance standards. It ensures the app is secure (using HTTPS), efficient, and uses up-to-date web technologies.

4. SEO: How Well the PWA Can Be Found and Ranked by Search Engines

SEO ensures that your PWA is optimized for search engines. This includes proper meta tags, mobile-friendliness, and structured HTML, helping the app rank higher in search results.

5. Progressive Web App Features: If it Behaves Like a PWA (Offline Access, etc.)

PWA features check if the app includes core characteristics like offline support via service workers, a web app manifest, and the ability to install the app on a device's home screen for a native-like experience.

Steps to perform the experiment:

1. **Open the website you want to test:** First, open the web app or website that you want to test in **Google Chrome**.
2. **Open Developer Tools in Chrome:**
 - Press Ctrl + Shift + I on your keyboard (Windows/Linux) or Cmd + Option + I (Mac).
 - Or right-click anywhere on the page and click **Inspect**.
3. **Run Lighthouse Audit:**
 - In the Developer Tools panel, click on the **Lighthouse** tab.
 - Under **Lighthouse**, you'll see options like **Performance**, **Accessibility**, **Best Practices**, **SEO**, and **PWA**.
 - Check the box for **PWA** to test if the website behaves like a Progressive Web App.
 - Now, click the **Generate Report** button.
4. **Wait for the Report:** Google Lighthouse will now analyze the website, and this might take a few moments.
5. **Review the Report:**
 - Once the audit is finished, Lighthouse will provide a detailed report.
 - The report will show scores for each category (e.g., PWA, performance, etc.) on a scale from 0 to 100.
 - For PWA, Lighthouse will specifically check features like:
 - **Service Worker:** Makes the app available offline.
 - **Web App Manifest:** Contains information like the app's name, icon, and theme color.

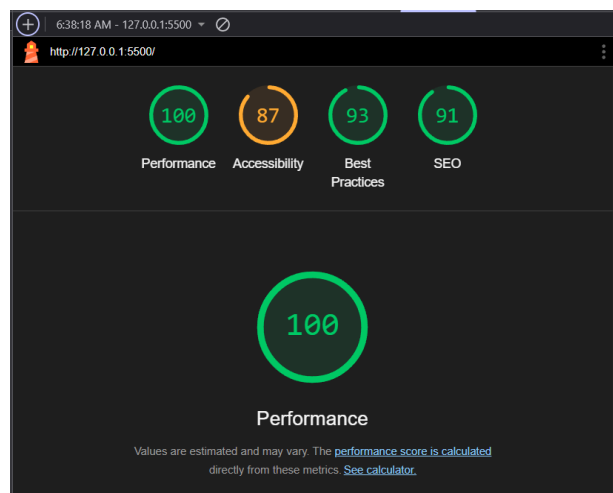
- **Add to Home Screen:** If the user can install the app on their home screen like a native app.

6. Interpret the Results:

- If your **PWA score is high** (above 90), it means the web app is well-optimized.
- If the score is low, you can see specific suggestions for improvement, like adding a service worker or fixing the manifest file.

Code: <https://github.com/Sairam-Vk-sudo/mplExp27/tree/main/11>

Output:



Google Lighthouse output

Conclusion: The Google Lighthouse PWA analysis tool provides a comprehensive evaluation of how well a web app performs as a Progressive Web App. By auditing key aspects such as performance, accessibility, best practices, SEO, and core PWA features, Lighthouse helps identify strengths and areas for improvement to deliver a seamless, native-app-like user experience. A high PWA score indicates that the app is optimized for offline use, fast loading, and easy installation, which enhances user engagement and accessibility across devices. Conversely, a low score highlights specific issues—such as missing service workers or manifest configurations—that developers can address to improve the app's reliability and usability. Overall, Lighthouse is an essential tool for developers aiming to build high-quality PWAs that meet modern web standards and provide a superior user experience.