

EXPERIMENT NO: - 11

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

THEORY: -

Google Lighthouse is an open-source tool that audits web applications based on multiple key parameters, including performance, accessibility, Progressive Web App (PWA) implementation, and best practices. It provides a detailed, automated report that helps developers optimize their websites efficiently. Unlike traditional manual audits, which can take days or even weeks, Lighthouse generates insights within minutes.

One of the key advantages of Lighthouse is its ease of use—no complex setup is required. Simply run it on a webpage or provide a URL, and it will generate an extensive performance report.

Key Features and Audit Metrics

Lighthouse can audit both desktop and mobile versions of a webpage. The core evaluation criteria include:

1. Performance

This metric measures how efficiently a webpage loads and displays content. Key factors influencing the performance score include:

- Page load speed – How quickly the page becomes visible to the user.
- First Contentful Paint (FCP) – The time taken for the first piece of content to appear.
- Largest Contentful Paint (LCP) – The time taken for the main content to fully load.
- Cumulative Layout Shift (CLS) – Measures how visually stable a page is (i.e., avoiding unexpected shifts in content).
- Time to Interactive (TTI) – The time it takes for the page to become fully functional. Lighthouse assigns a score from 0 to 100 based on percentile rankings, where:
 - 100 → Top 2% of websites (98th percentile)
 - 50 → Around the 75th percentile
 - Lower scores → Indicate areas that need optimization

2. Progressive Web App (PWA) Score (Mobile)

With the rise of PWAs, modern web applications aim to provide a native app-like experience.

Lighthouse evaluates the PWA implementation based on Google's Baseline PWA Checklist, which includes:

- Service Worker implementation – Ensuring offline support and background synchronization.
- App Manifest compliance – Providing metadata for better mobile integration.
- Viewport configuration – Optimizing mobile responsiveness.
- Performance in script-disabled environments – Ensuring the page functions even when JavaScript is disabled.

A high PWA score indicates that the application meets essential PWA criteria and provides an app-like user experience.

3. Accessibility

Accessibility ensures that web applications are usable by individuals with disabilities. Lighthouse audits a webpage based on:

- ARIA attributes – Enhancing accessibility through attributes like aria-required.
- Text alternatives for media – Ensuring audio and visual content is accessible.
- Semantic HTML – Proper use of <section>, <article>, <button>, and other elements that improve screen-reader compatibility.

Unlike other metrics, accessibility checks follow a pass/fail approach—if a necessary feature is missing, it significantly impacts the score. A higher accessibility score ensures inclusivity for users with visual or cognitive impairments.

4. Best Practices

This metric evaluates whether the website follows modern web development best practices, including:

- Use of HTTPS – Ensuring secure data transmission.
- Avoiding deprecated code – Preventing the use of outdated elements, directives, and libraries.
- Secure password inputs – Disabling paste-into fields to mitigate credential theft risks.
- User security alerts – Prompting users about geo-location access and cookie usage on load. A high score indicates that the website follows industry standards, improving security, usability, and maintainability.

Manifest.json

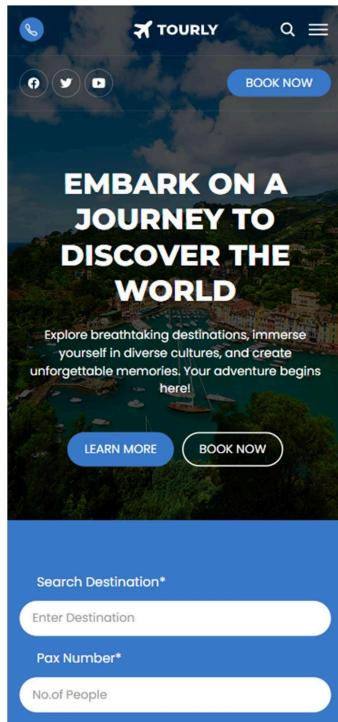
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(i) The Lighthouse tool provides links to content hosted on third-party websites. [Don't show again](#) [Show more](#) [X](#)

+ 10:42:45 pm - 127.0.0.1:8081 [🔗](#)

 <http://127.0.0.1:8081/> [⋮](#)

Performance: 99 Accessibility: 96 Best Practices: 93 SEO: 91

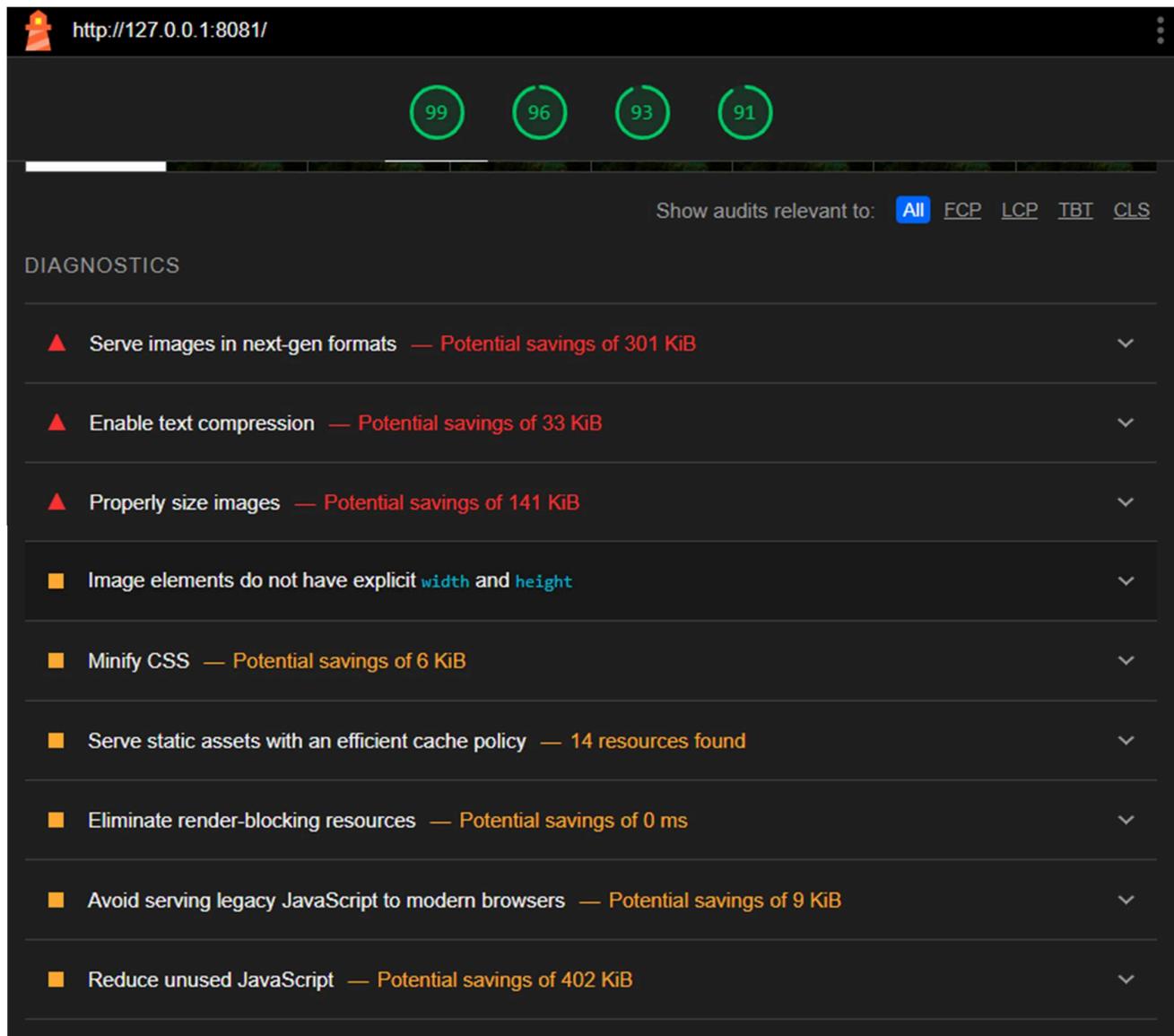
Performance

Values are estimated and may vary. The [performance score is calculated](#) directly from these metrics. See [calculator](#).

▲ 0–49 ■ 50–89 ● 90–100

METRICS [Expand view](#)





The screenshot shows the Lighthouse performance audit interface for the URL <http://127.0.0.1:8081/>. The top navigation bar includes a logo, the URL, and a three-dot menu icon. Below the header are four circular performance metrics with scores: 99, 96, 93, and 91. A progress bar spans the width of the screen below these metrics. To the right of the progress bar is a "Show audits relevant to:" dropdown with options: All (selected), FCP, LCP, TBT, and CLS. The main content area is titled "DIAGNOSTICS" and lists various performance recommendations with their potential savings:

- ▲ Serve images in next-gen formats — Potential savings of 301 KiB
- ▲ Enable text compression — Potential savings of 33 KiB
- ▲ Properly size images — Potential savings of 141 KiB
- Image elements do not have explicit `width` and `height`
- Minify CSS — Potential savings of 6 KiB
- Serve static assets with an efficient cache policy — 14 resources found
- Eliminate render-blocking resources — Potential savings of 0 ms
- Avoid serving legacy JavaScript to modern browsers — Potential savings of 9 KiB
- Reduce unused JavaScript — Potential savings of 402 KiB

Install TOURLY - Travel Ecommerce a...
Publisher: 127.0.0.1:8081

Use this site often? Install the app which:

- Opens in a focused window
- Has quick access options like pin to taskbar
- Syncs across multiple devices

[Install](#) [Not now](#)

Lighthouse

SEO 91

SI FCP
CLS LCP
TBT

Performance 99

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▲ 0–49 ■ 50–89 ● 90–100

