

## Experiment 11

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

### Theory:

Google Lighthouse is an open-source, automated tool for improving the quality of web pages. It is used to audit web pages, measure their performance, accessibility, progressive web app (PWA) capabilities, SEO (Search Engine Optimization), and more. Lighthouse is commonly used by developers, webmasters, and SEO professionals to identify areas where a website can be optimized for better user experience, performance, and search engine rankings.

### Features of Google Lighthouse:

#### 1. Performance:

- a. Lighthouse assesses a webpage's loading speed and responsiveness.
- b. It provides metrics such as First Contentful Paint (FCP), Largest Contentful Paint (LCP), Time to Interactive (TTI), and more.
- c. Suggestions are given to improve these metrics, like optimizing images, deferring offscreen images, minifying CSS and JavaScript, etc.

#### 2. Accessibility:

- a. Lighthouse evaluates a webpage's accessibility for users with disabilities.
- b. It checks for proper HTML markup, ARIA attributes, color contrast, and other factors that impact accessibility.
- c. Suggestions are provided to improve accessibility, such as adding alt text to images, ensuring keyboard navigation, and using proper heading structure.

#### 3. Best Practices:

- a. Lighthouse checks a webpage against web development best practices.

- b. It looks for deprecated JavaScript features, security vulnerabilities, outdated libraries, and more.
- c. Recommendations are given to follow modern web development practices and ensure a secure website.

**4. SEO (Search Engine Optimization):**

- a. Lighthouse provides insights into a webpage's SEO performance.
- b. It checks for meta tags, heading structure, sitemap usage, and other SEO-related elements.
- c. Recommendations are offered to improve the webpage's visibility in search engine results.

**5. Progressive Web App (PWA):**

- a. For websites aiming to be Progressive Web Apps, Lighthouse evaluates their PWA capabilities.
- b. It checks for features such as offline functionality, fast loading times on repeat visits, and app-like behavior.
- c. Suggestions are given to enhance the website's PWA features, improving user engagement and experience.

**6. Metrics and Scoring:**

- a. Lighthouse provides a comprehensive report with scores for each category (Performance, Accessibility, Best Practices, SEO, PWA).
- b. These scores give a quick overview of how well a webpage is performing in each area.
- c. Developers can use these scores to prioritize improvements and track progress over time.

**7. Command Line Interface (CLI):**

- a. Lighthouse can be used both through its web interface and as a command-line tool.
- b. The CLI allows for integration into automated build processes and continuous integration (CI) workflows.
- c. This makes it easy to run audits regularly, ensuring ongoing improvements to web performance and quality.

**8. Chrome DevTools Integration:**

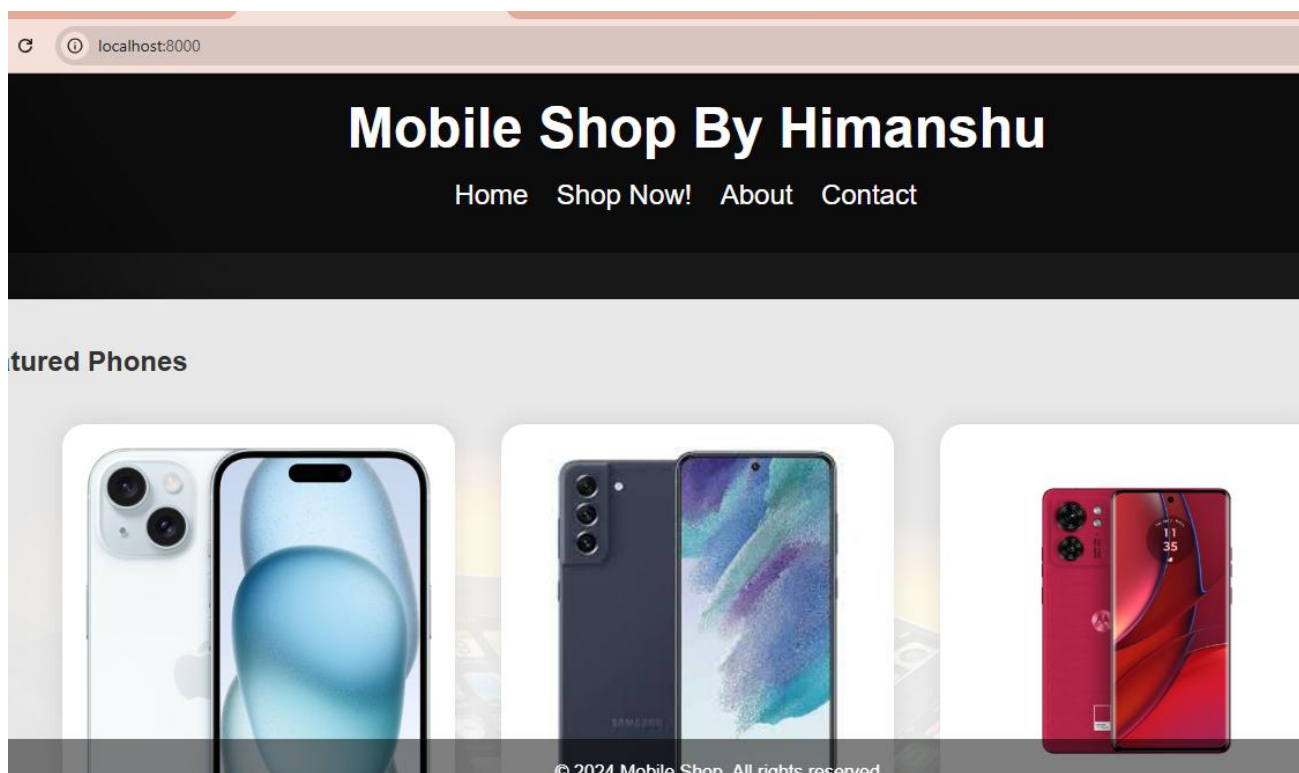
- a. Lighthouse is integrated into Google Chrome's DevTools.

- b. Developers can run audits directly from the browser, making it convenient to analyze and improve web pages during development.
- c. The DevTools integration offers real-time feedback and suggestions as developers make changes to their code.

**Steps:** To use Google Lighthouse to test the Progressive Web App (PWA) functioning, follow these steps:

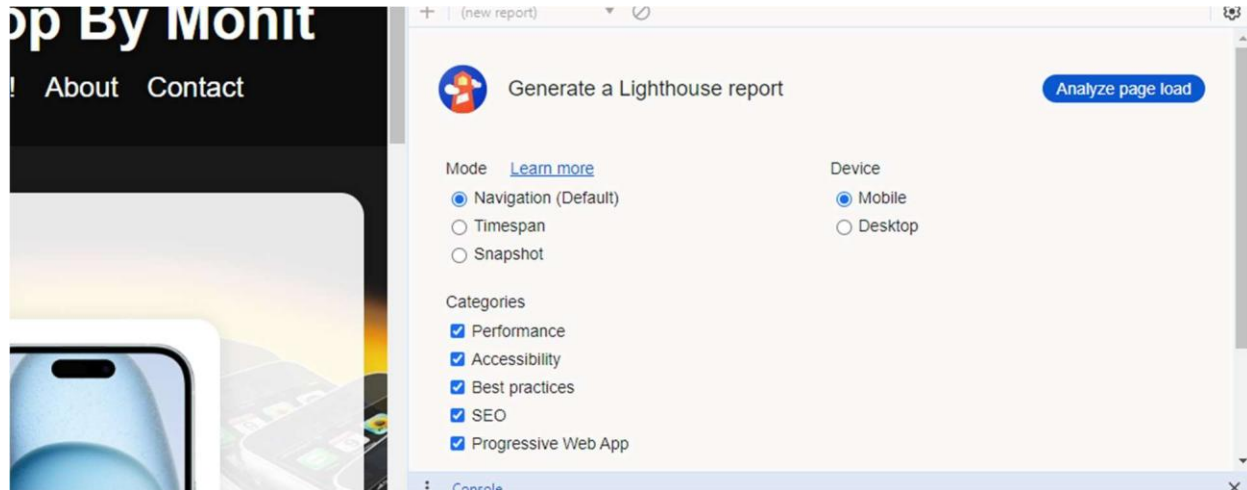
1. Open EDGE DevTools:

- Open edge browser.
- Go to the website you want to test as a PWA. - Right-click on the page and select "Inspect" or press `Ctrl+Shift+I` (Windows/Linux) or `Cmd+Option+I` (Mac) to open Chrome DevTools.



## 2. Navigate to the Lighthouse Tab:

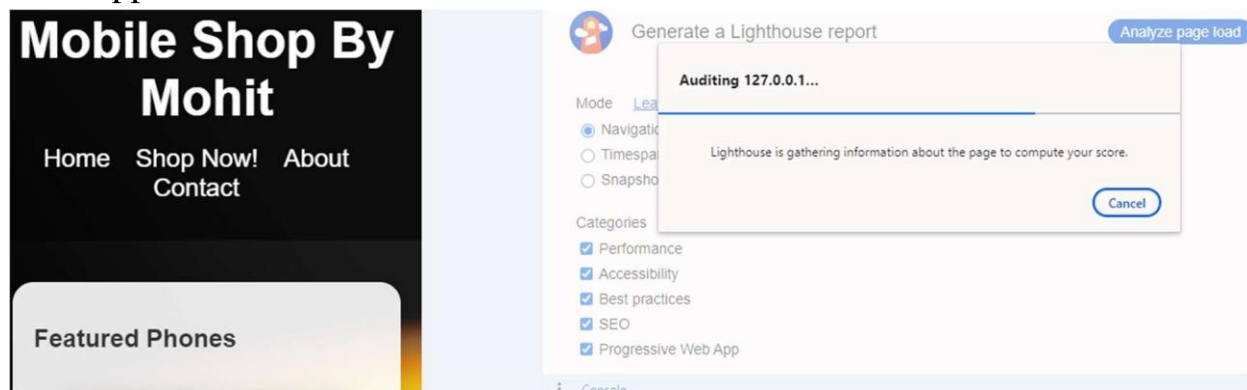
- In edge DevTools, click on the "Lighthouse" tab at the top of the DevTools panel.



### 3. Run the Lighthouse Audit:

- Click on the "Generate report" button to start the audit process.

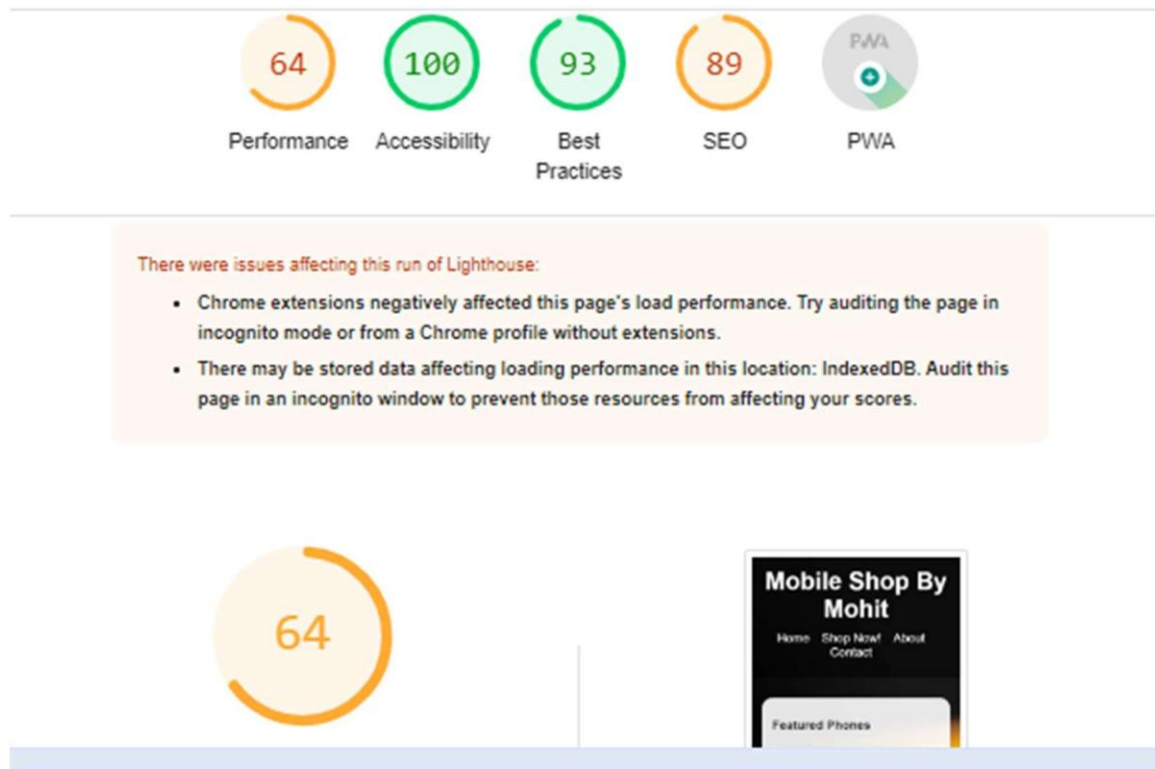
You can choose to audit for Performance, Accessibility, Best Practices, SEO, and Progressive Web App (PWA) functionality. Make sure to select the "Progressive Web App" checkbox.



### 4. View the Audit Results:

-After the audit is complete, Lighthouse will display a report with scores and detailed information for each category.

-In the PWA section, you can check if your website meets the PWA criteria, such as having a service worker, being responsive on different devices, having a valid manifest file, etc. -Lighthouse will provide suggestions for improvements and optimizations to enhance your PWA functionality.



**CONCLUSION:** Hence, we have understood the working of Google Lighthouse PWA analysis tool and used Google Lighthouse tool to test and analyze the performance statistics of our E-commerce Progressive web application.