

EXPERIMENT NO. 11

MAD and PWA Lab

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

Theory:

Google Lighthouse

Lighthouse is an open-source, automated tool for improving the quality of web pages. You can run it against any web page, public or requiring authentication. It has audits for performance, accessibility, progressive web apps, SEO and more.

You can run Lighthouse in Chrome DevTools, from the command line, or as a Node module. You give Lighthouse a URL to audit, it runs a series of audits against the page, and then it generates a report on how well the page did. From there, use the failing audits as indicators on how to improve the page. Each audit has a reference doc explaining why the audit is important, as well as how to fix it.

Features of Lighthouse

Google Lighthouse gives a breakdown of your site into the accompanying metrics. Here is a brief explanation of each of the aforementioned metrics:

1. Performance

Performance is generally viewed as the most valuable metric given by the Google Lighthouse tool. Like the PageSpeed Insights, the Performance area of the Lighthouse report contains a few helpful metrics you can use to advance your site to climb Google's rankings. The Performance segment of the Lighthouse report joins the Opportunities, Field Data, Lab Data, and Diagnostics metrics of the PageSpeed Insights tool. A great example is the opportunities metric as it flags three types of render-blocking URL's namely stylesheets, scripts, and HTML imports. This merged perspective on performance metrics gives an exact and valuable analysis of your site's performance and any progressions you should make to expand your site's exhibition.

2. Accessibility

The first of the new regions of Google Lighthouse is the Accessibility metric. Basically what this metric does is feature potential chances to improve the availability and client experience of your mobile app or website. Following the accessibility improvement report will guarantee that your clients can without much of a stretch explore and utilize your site. Just as guaranteeing that you have the most obvious opportunity with regards to positioning better on web search engines.

3. Best Practices

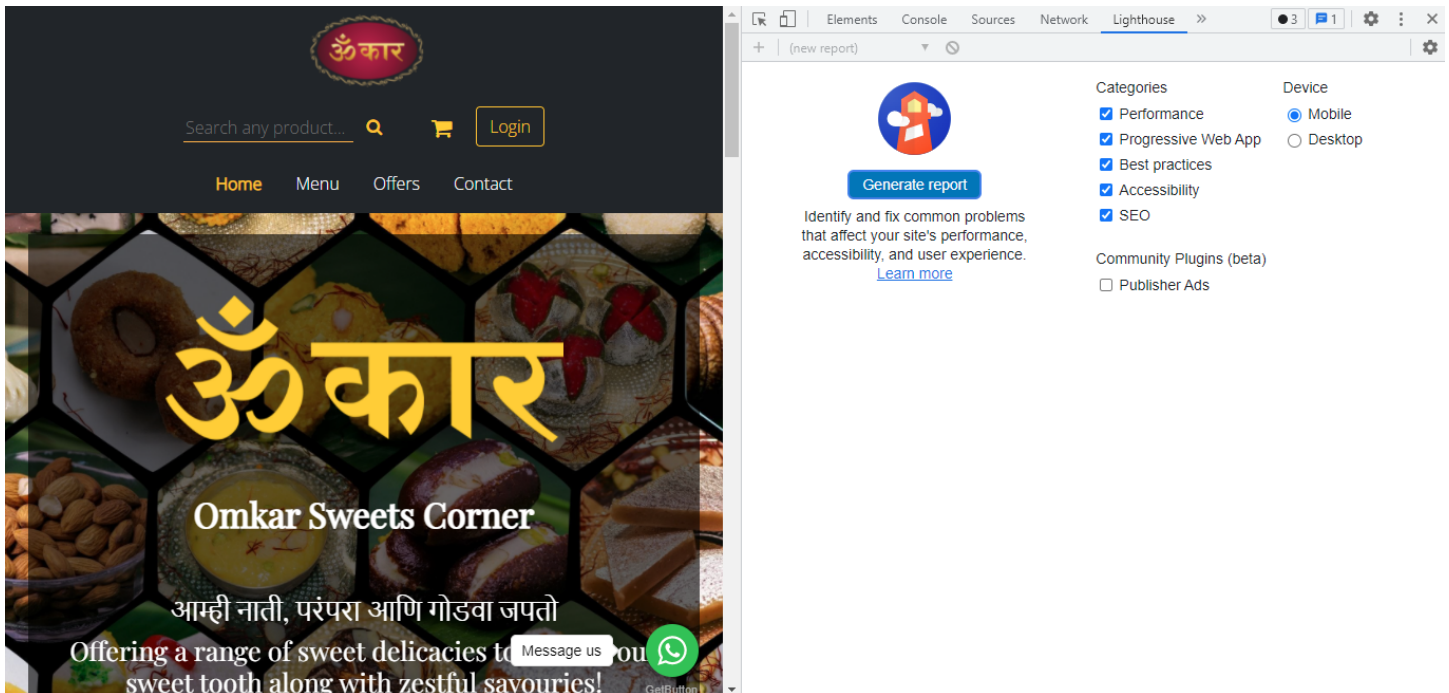
Another segment new to Google's analysis tools is the Best Practices metric. This region of the Lighthouse report doesn't carefully give execution related data. However, it will give you recommendations which can improve both your exhibition and client experience, particularly for mobile sites.

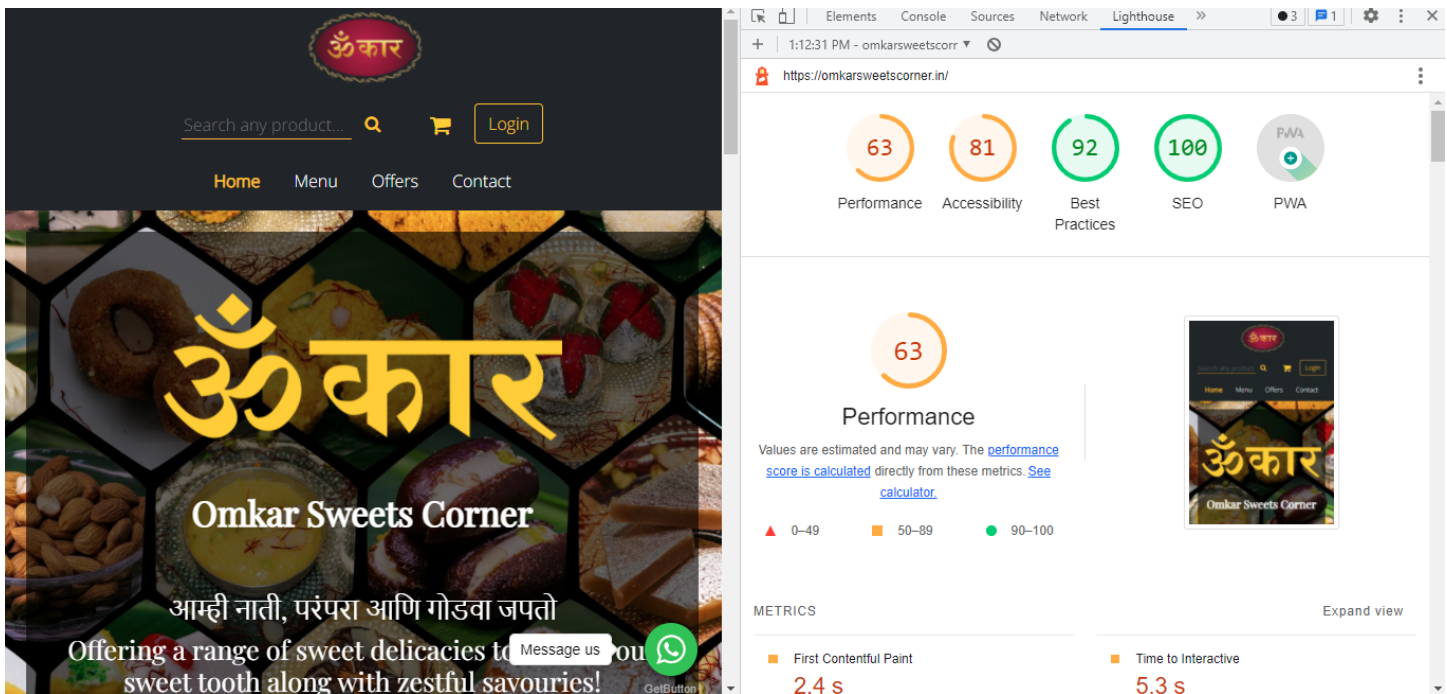
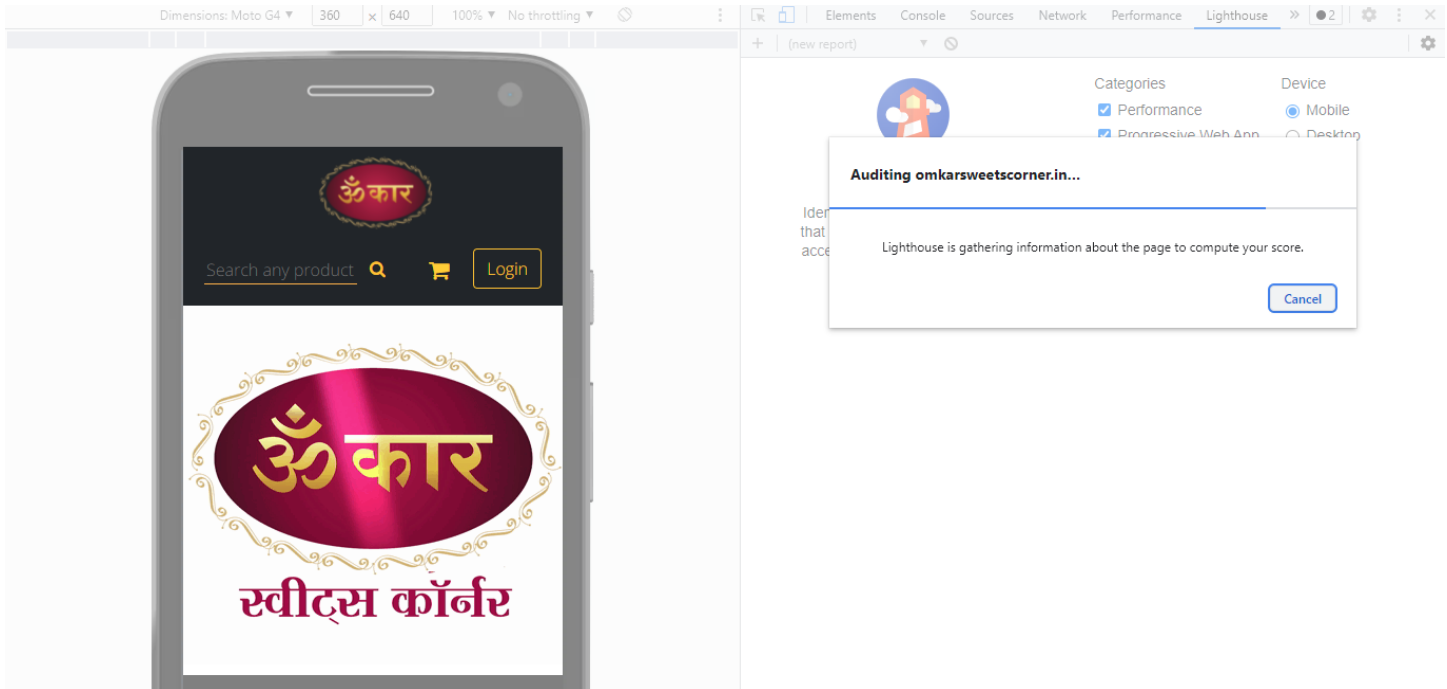
4. SEO

The latest and most dynamic of the highlights in Google's Lighthouse instrument is the SEO metric. PageSpeed Insights doesn't offer this tool. This is why most web designers and SEO specialists prefer to utilize Google Lighthouse to analyze a website. The SEO metric gives fundamental tools to examine your page's streamlining for search engine results rankings. While there are numerous more factors which Lighthouse doesn't consider or quantify, the most essential focuses are secured.

5. Progressive Web Applications

The Progressive Web App area is another of Google's most up to date execution measurements incorporated into its Lighthouse tool. While the meaning of a Progressive Web App (PWA) hasn't been especially clear, Google's documentation expresses that there are a few key variables which make a site a PWA. A great feature of this metric is registering service workers which allow you to enable push notifications on your web app



For Mobile Device



Performance



Accessibility



Best Practices



SEO



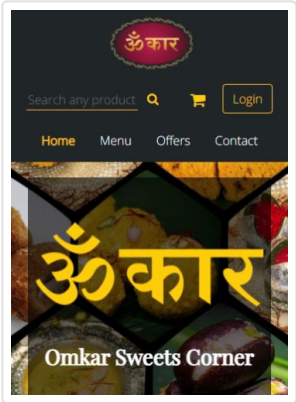
PWA



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](#)

First Contentful Paint

2.4 s

Time to Interactive

5.3 s

▲ Speed Index

6.8 s

Total Blocking Time

30 ms

▲ Largest Contentful Paint

36.5 s

Cumulative Layout Shift

0.042

[View Original Trace](#)

[View Treemap](#)



Show audits relevant to: All [FCP](#) [TBT](#) [LCP](#) [CLS](#)

OPPORTUNITIES

Opportunity	Estimated Savings
▲ Use video formats for animated content	26.85 s ▼
▲ Properly size images	21.6 s ▼
▲ Serve images in next-gen formats	1.5 s ▼
▲ Eliminate render-blocking resources	0.99 s ▼
Preconnect to required origins	0.53 s ▼
Reduce unused CSS	0.3 s ▼
Reduce unused JavaScript	0.15 s ▼

These suggestions can help your page load faster. They don't [directly affect](#) the Performance score.

DIAGNOSTICS

▲ Avoid enormous network payloads — Total size was 14,565 KiB	▼
▲ Ensure text remains visible during webfont load	▼
▲ Does not use passive listeners to improve scrolling performance	▼
▲ Image elements do not have explicit width and height	▼
▲ Serve static assets with an efficient cache policy — 24 resources found	▼
Minimize main-thread work — 2.3 s	▼
○ Avoid chaining critical requests — 17 chains found	▼
○ Keep request counts low and transfer sizes small — 52 requests • 14,565 KiB	▼
○ Largest Contentful Paint element — 1 element found	▼
○ Avoid large layout shifts — 5 elements found	▼
○ Avoid long main-thread tasks — 7 long tasks found	▼

PASSED AUDITS (22) [Show](#)

NAMES AND LABELS

- ▲ Buttons do not have an accessible name ▼
 - ▲ Form elements do not have associated labels ▼
 - ▲ Links do not have a discernible name ▼

CONTRAST

- ▲ Background and foreground colors do not have a sufficient contrast ratio.

NAVIGATION

- ▲ `[id]` attributes on active, focusable elements are not unique
- ▲ Heading elements are not in a sequentially-descending order

ADDITIONAL ITEMS TO MANUALLY CHECK (10) Show

These items address areas which an automated testing tool cannot cover. Learn more in our guide on [conducting an accessibility review](#).

PASSED AUDITS (17) Show

NOT APPLICABLE (21) Show



Best Practices

GENERAL

- ▲ Browser errors were logged to the console ▼
- Detected JavaScript libraries ▼

TRUST AND SAFETY

- Ensure CSP is effective against XSS attacks ▼

PASSED AUDITS (12) Show

NOT APPLICABLE (1) Show



SEO

These checks ensure that your page is following basic search engine optimization advice. There are many additional factors Lighthouse does not

score here that may affect your search ranking, including performance on [Core Web Vitals](#). [Learn more](#).

ADDITIONAL ITEMS TO MANUALLY CHECK (1)

Show

Run these additional validators on your site to check additional SEO best practices.

PASSED AUDITS (14)

Show



PWA

These checks validate the aspects of a Progressive Web App. [Learn more](#).

INSTALLABLE

Web app manifest and service worker meet the installability requirements

▼

PWA OPTIMIZED

Registers a service worker that controls page and `start_url`

▼

Configured for a custom splash screen

▼

Sets a theme color for the address bar.

▼

Content is sized correctly for the viewport

▼

Has a `<meta name="viewport">` tag with `width` or `initial-scale`

▼

Provides a valid `apple-touch-icon`

▼

▲ Manifest doesn't have a maskable icon

▼

ADDITIONAL ITEMS TO MANUALLY CHECK (3)

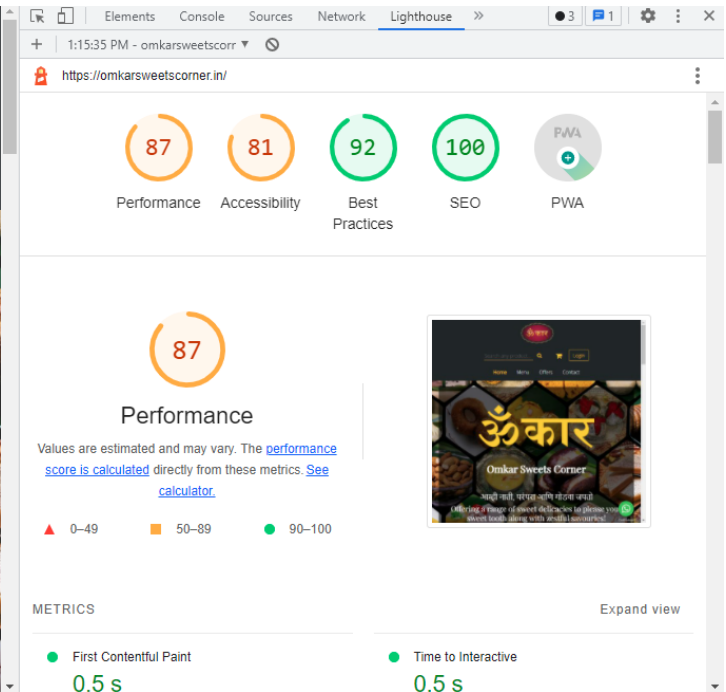
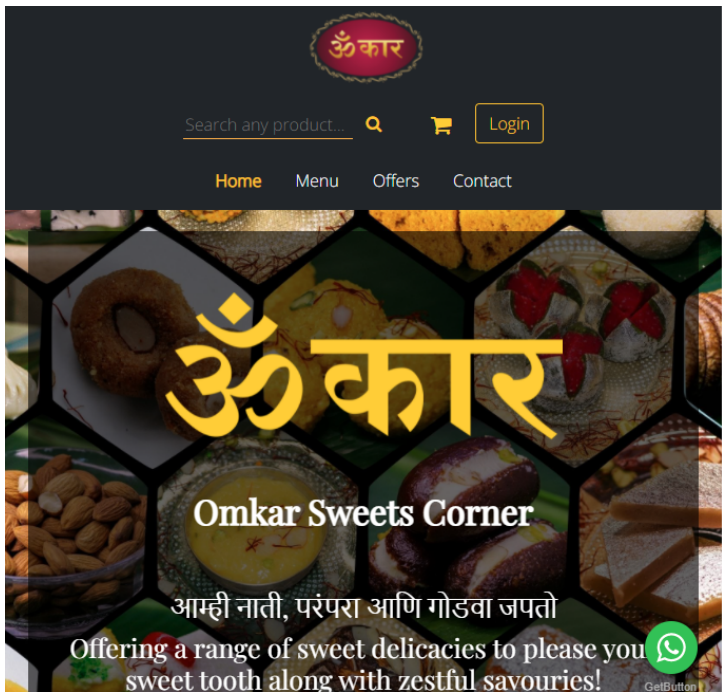
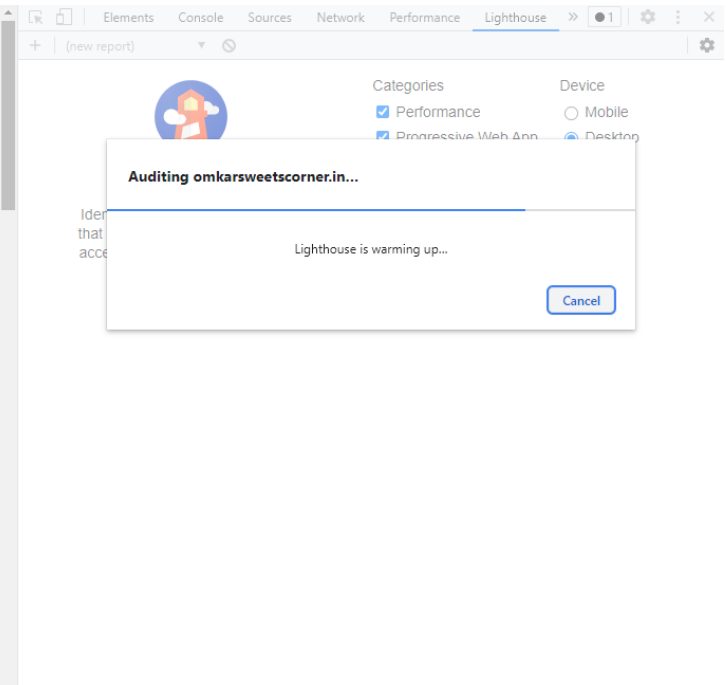
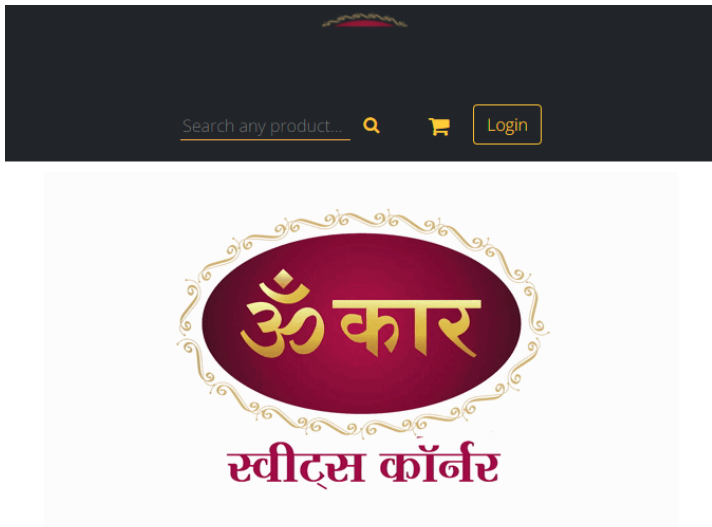
Show

These checks are required by the baseline [PWA Checklist](#) but are not automatically checked by Lighthouse. They do not affect your score but it's important that you verify them manually.

Captured at Mar 30, 2022, 1:12 PM GMT+5:30 Initial page load	Emulated Moto G4 with Lighthouse 9.2.0 Slow 4G throttling	Single page load Using Chromium 99.0.4844.84 with devtools
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Generated by **Lighthouse** 9.2.0 | [File an issue](#)

For Desktop Device





Performance



Accessibility



Best Practices



SEO



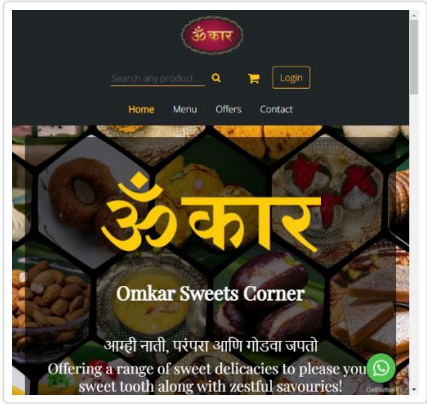
PWA



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](#)

First Contentful Paint

0.5 s

Time to Interactive

0.5 s

▲ Speed Index

2.8 s

Total Blocking Time

0 ms

Largest Contentful Paint

1.6 s

Cumulative Layout Shift

0.057

[View Original Trace](#)

[View Treemap](#)



Show audits relevant to: [All](#) [FCP](#) [TBT](#) [LCP](#) [CLS](#)

OPPORTUNITIES

Opportunity	Estimated Savings
▲ Use video formats for animated content	4.28 s ▾
▲ Properly size images	3.52 s ▾
Serve images in next-gen formats	0.24 s ▾
Eliminate render-blocking resources	0.22 s ▾

These suggestions can help your page load faster. They don't [directly affect](#) the Performance score.

DIAGNOSTICS

▲ Avoid enormous network payloads — Total size was 14,575 KiB	▾
▲ Ensure text remains visible during webfont load	▾
▲ Does not use passive listeners to improve scrolling performance	▾
▲ Image elements do not have explicit width and height	▾
▲ Serve static assets with an efficient cache policy — 24 resources found	▾
○ Avoid chaining critical requests — 17 chains found	▾
○ Keep request counts low and transfer sizes small — 52 requests • 14,575 KiB	▾
○ Largest Contentful Paint element — 1 element found	▾
○ Avoid large layout shifts — 5 elements found	▾
○ Avoid long main-thread tasks — 2 long tasks found	▾

More information about the performance of your application. These numbers don't [directly affect](#) the Performance score.

PASSED AUDITS (26)	Show
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Accessibility

These checks highlight opportunities to [improve the accessibility of your web app](#). Only a subset of accessibility issues can be automatically detected so manual testing is also encouraged.

NAMES AND LABELS

▲	Buttons do not have an accessible name	▼
▲	Form elements do not have associated labels	▼
▲	Links do not have a discernible name	▼

These are opportunities to improve the semantics of the controls in your application. This may enhance the experience for users of assistive technology, like a screen reader.

CONTRAST

▲	Background and foreground colors do not have a sufficient contrast ratio.	▼
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These are opportunities to improve the legibility of your content.

NAVIGATION

▲	[id] attributes on active, focusable elements are not unique	▼
▲	Heading elements are not in a sequentially-descending order	▼

These are opportunities to improve keyboard navigation in your application.

ADDITIONAL ITEMS TO MANUALLY CHECK (10)

Show

These items address areas which an automated testing tool cannot cover. Learn more in our guide on [conducting an accessibility review](#).

PASSED AUDITS (17)

Show


NOT APPLICABLE (21)

Show




Best Practices

GENERAL

- 

Browser errors were logged to the console

▼
- 

Detected JavaScript libraries

▼

TRUST AND SAFETY

- 

Ensure CSP is effective against XSS attacks

▼

PASSED AUDITS (12)

Show

NOT APPLICABLE (1)

Show



SEO

These checks ensure that your page is following basic search engine optimization advice. There are many additional factors Lighthouse does not score here that may affect your search ranking, including performance on [Core Web Vitals](#). [Learn more](#).

ADDITIONAL ITEMS TO MANUALLY CHECK (1)

Show

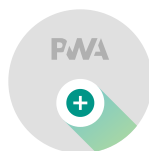
Run these additional validators on your site to check additional SEO best practices.

PASSED AUDITS (12)

Show

NOT APPLICABLE (2)

Show



PWA

These checks validate the aspects of a Progressive Web App. [Learn more.](#)

INSTALLABLE

Web app manifest and service worker meet the installability requirements



PWA OPTIMIZED

Registers a service worker that controls page and `start_url`



Configured for a custom splash screen



Sets a theme color for the address bar.



☐ Content is sized correctly for the viewport




Has a `<meta name="viewport">` tag with `width` or `initial-scale`



Provides a valid `apple-touch-icon`



 Manifest doesn't have a maskable icon



ADDITIONAL ITEMS TO MANUALLY CHECK (3)

Show

These checks are required by the baseline [PWA Checklist](#) but are not automatically checked by Lighthouse. They do not affect your score but it's important that you verify them manually.

Captured at Mar 30, 2022, 1:15
PM GMT+5:30
Initial page load

Emulated Desktop with
Lighthouse 9.2.0
Custom throttling

Single page load
Using Chromium 99.0.4844.84
with devtools

