Core Web Vitals

Performance & User Experience Metrics

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What are the Core Web Vitals?

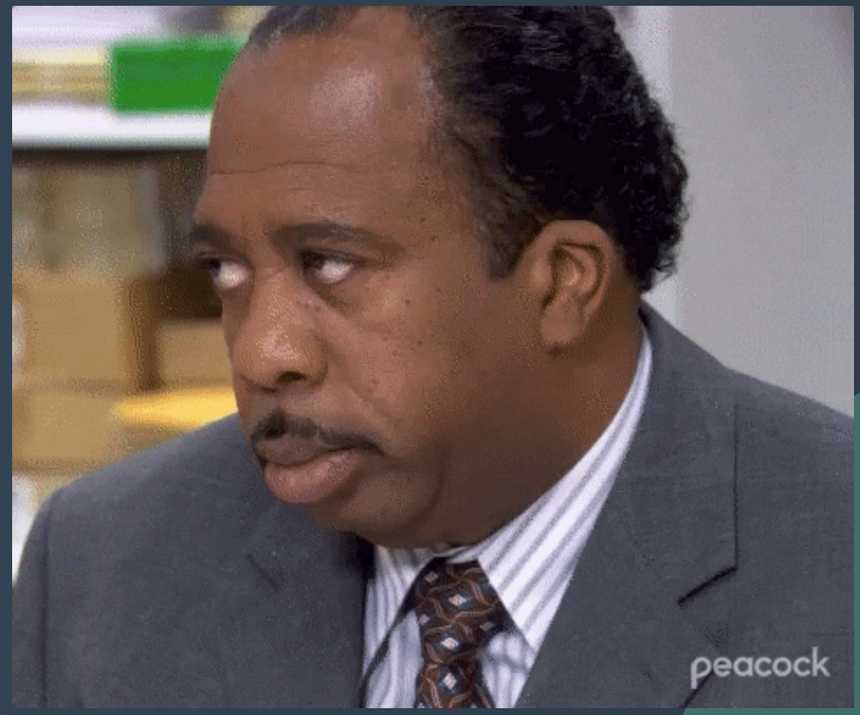
3 core metrics specified by Google to measure **performance** & the **user experience** for web pages.

- **Largest Contentful Paint (LCP)** - loading
- **First Input Delay (FID)** - interactivity
- **Cumulative Layout Shift (CLS)** - visual stability

Why should I care?

- Better web vitals indicate a **better user experience**
- Monitoring those vitals can help **identify performance issues**
- **Google Search rankings** take the vitals into account to determine a site’s page ranking

Learn more: Google Search - page experience



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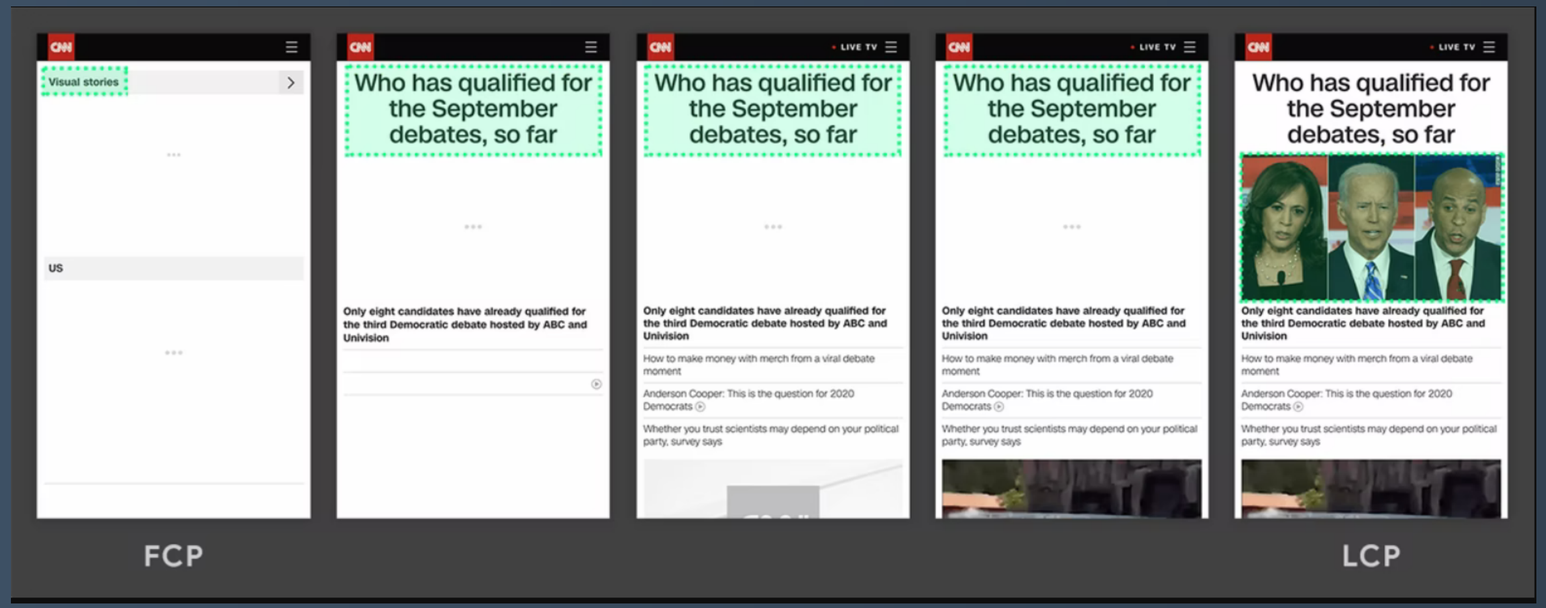
Metrics Definition

Largest Contentful Paint (LCP)

Measures the time at which the **largest content** on the page is **rendered**.

–> page **loading speed**

A good LCP is <2.5s



First Input Delay (FID)

"FID measures the delay between when a user first interacts with a page [...] and when the browser is actually able to begin processing event handlers in response to that interaction" - web.dev - FID

ex: click a link, tap a button, use a JS-powered control...

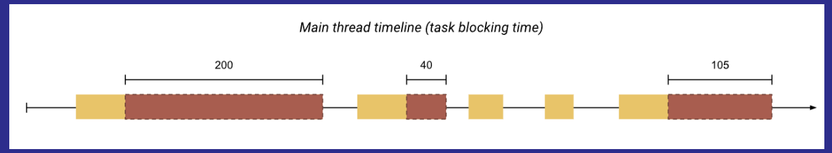
–> page **interactivity & load responsiveness**

FID (and TBT) can help identify **performance issues**

ex: main thread blocked while parsing/executing a large JS file

A good FID is <100ms

Total Blocking Time (TBT, tasks >50ms) is a substitute to FID when lab testing



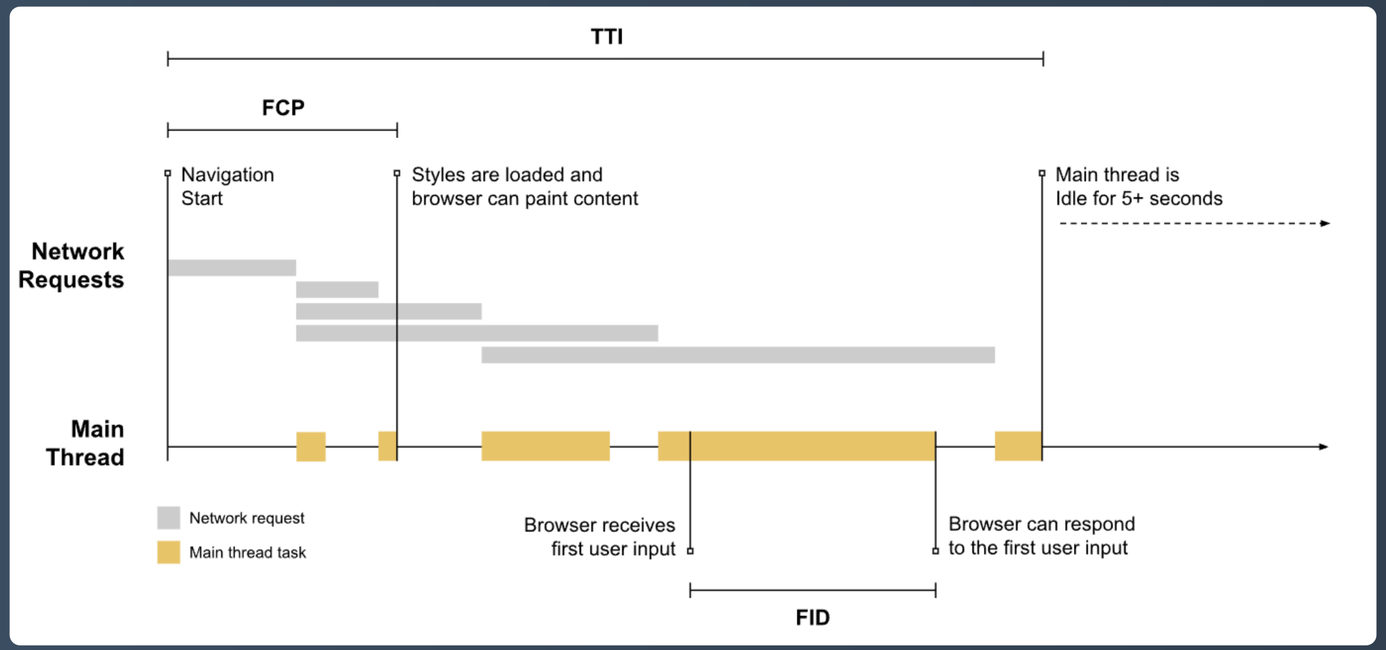
TBT representation on main thread timeline

First Input Delay (FID)

Schema representing FID:

- delay after first user input before the browser can respond to the event

See web.dev - FID

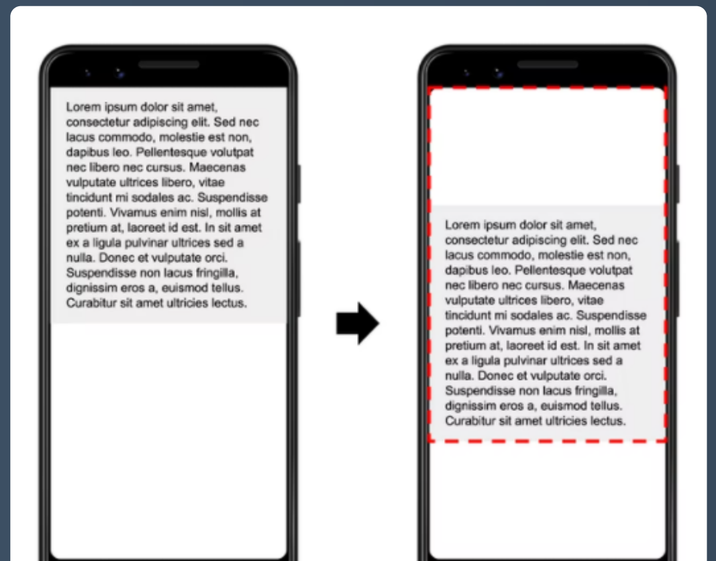


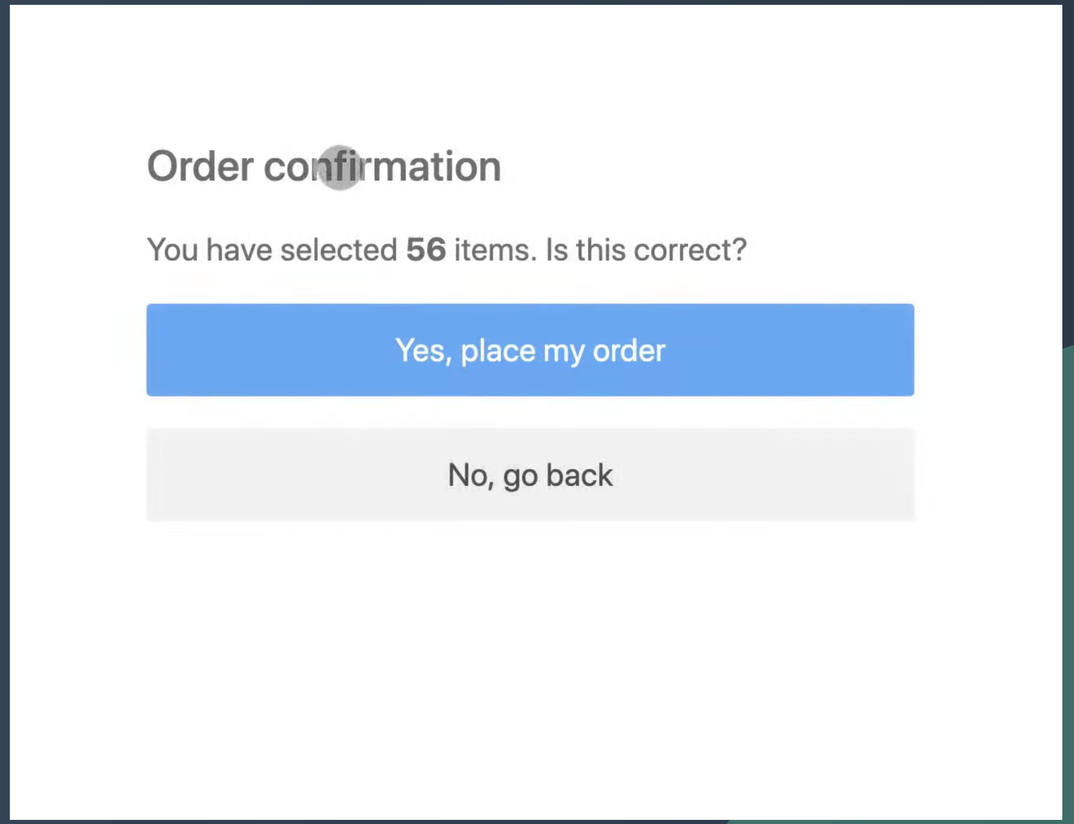
Cumulative Layout Shift (CLS)

What is a Layout Shift?

A layout shift is when **a visible element changes position**, usually due to an element being added to the DOM (above it).

Some layout shifts are *fine* (ex: shortly after user events).





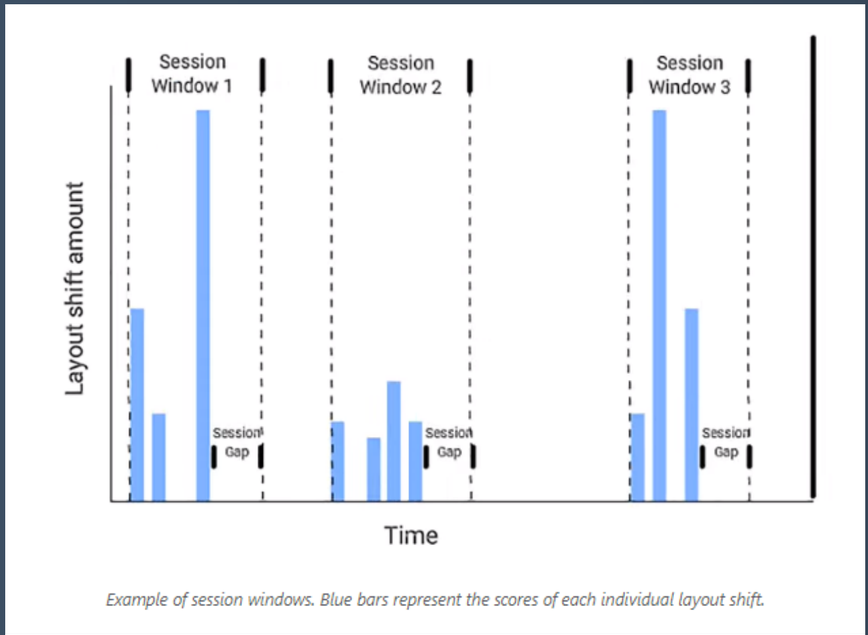
A layout shift in action... 😠

Cumulative Layout Shift (CLS)

The **CLS** is a measure of the **largest burst of layout shift scores** for every unexpected layout shift that occurs during the entire lifespan of a page.

–> page **visual stability** over time

A good CLS is <0.1



Example of session windows. Blue bars represent the scores of each individual layout shift.

source: web.dev - CLS

Improving Web Vitals Scores

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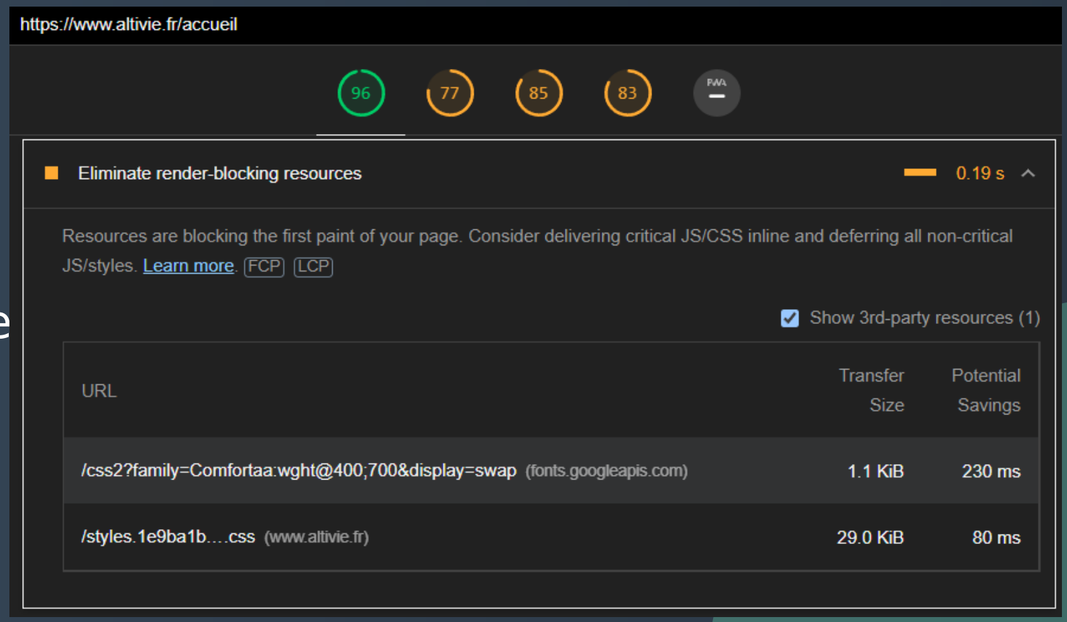
Improve the LCP score (1/3)

Make sure your resources are **rendered quickly**.

- use SSR or SSG when possible for a faster load
- use progressive loading techniques

  ex: lazy-loading on images, blurred placeholders
- load JS/CSS in a way that is not blocking the HTML parse

  ex: CSS / JS code splitting, load critical files first



PageSpeed Insights report: Render-blocking resources section

Efficiently load 3rd party JS

Defer non-critcal CSS

Optimize 3rd-party JS (lab tutorial)

Improve the LCP score (2/3)

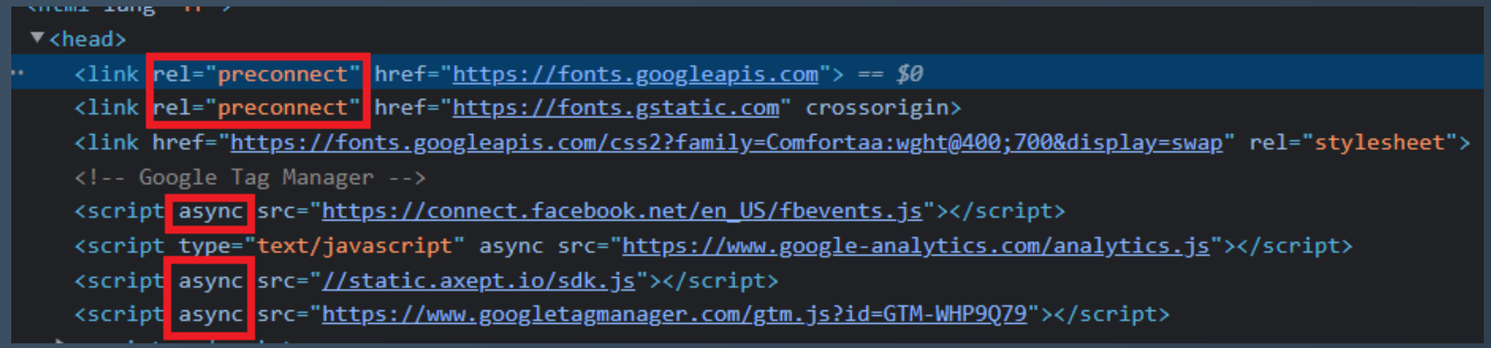
Make sure your resources are **discovered quickly**.

- load resources direclty from the main HTML document

  ex: inline fonts, inline critical CSS

- use resource hints to set the loading priority for important resources

  ex: preconnect, prefetch, prerender on links, see W3 Resource Hints



Adding resource hints & async/defer to improve page load performance

Improve the LCP score (3/3)

Make sure your resources are **sent quickly**.

- Use CDNs (closer to the edge user, faster response times)
- Optimize server response times
- Use compression for resources

  ex: gzip / brotli compression formats
- Optimize images and use newer formats

  ex: WebP, AVIF (not fully supported)

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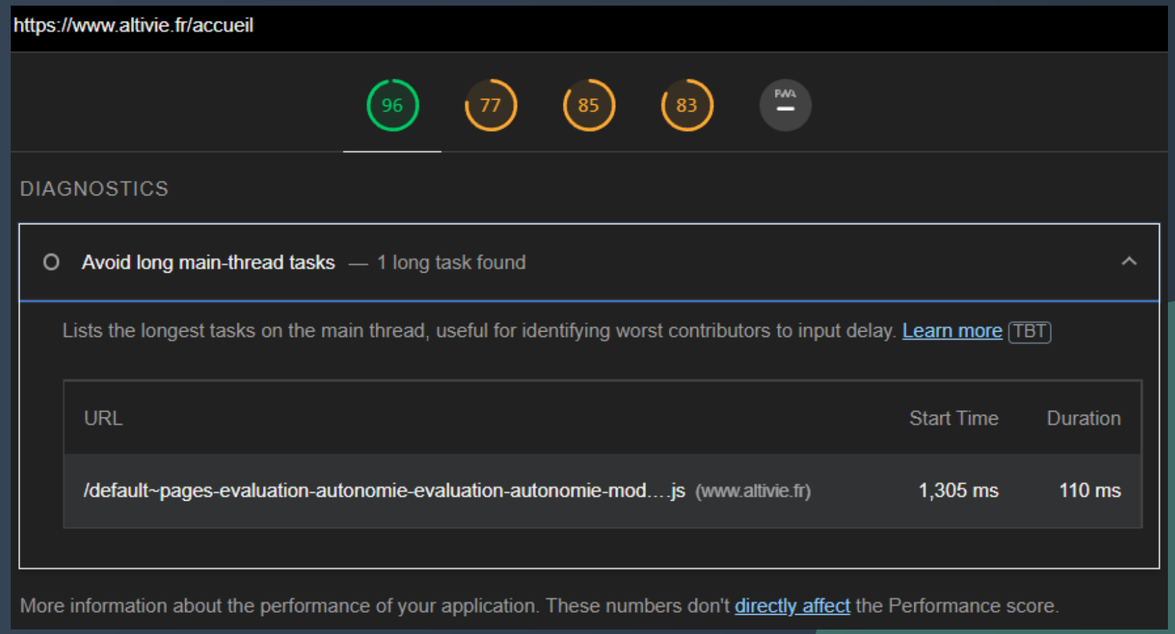
Improve the FID score

- avoid loading and running heavy Javascript during the initial page load
- use **code splitting** & **lazy-loading**, remove dead code, analyze your **bundle sizes** and 3rd party code
- use LightHouse to identify scripts running **long main-thread tasks** and the **Total Blocking Time** metrics

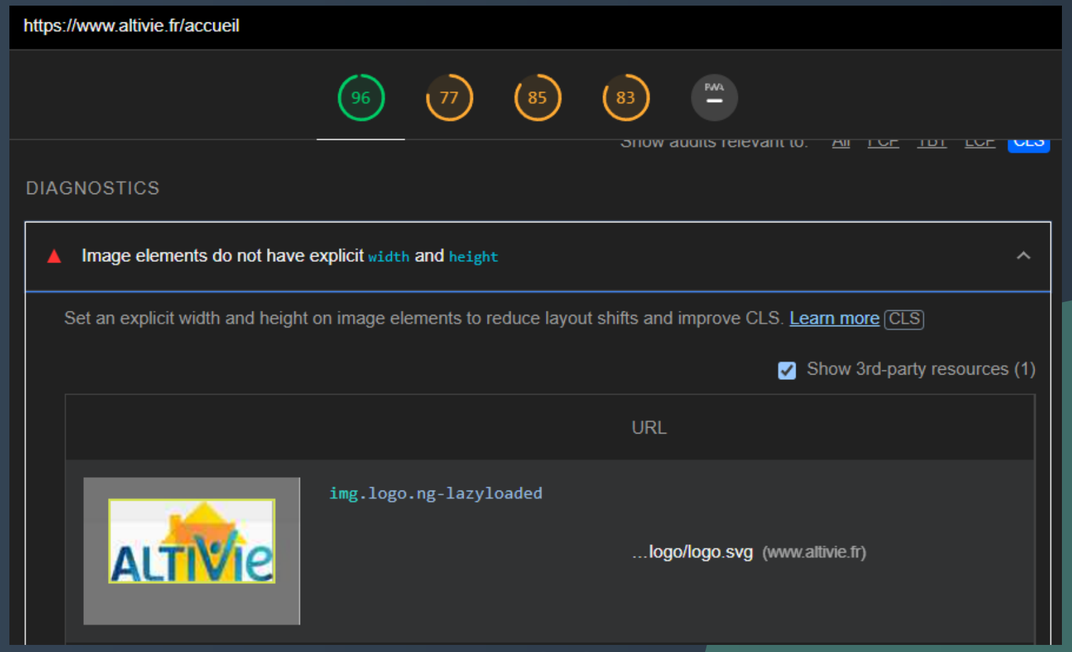


PageSpeed Insights report: "Avoid Long Main Thread Tasks" section

Improve the CLS score

- Set **width/height atttributes** on all images, videos, iframes
- Avoid CSS animations that cause layout shifts
- Don’t add any element above the loaded content unless its a response to the user interaction

  ex: opening a filter box or a menu
- Use LightHouse’s ***"Avoid large layout shifts"* section** to identify elements creating a layout shift



PageSpeed Insights report: CLS diagnostic on images

Measuring Web Vitals

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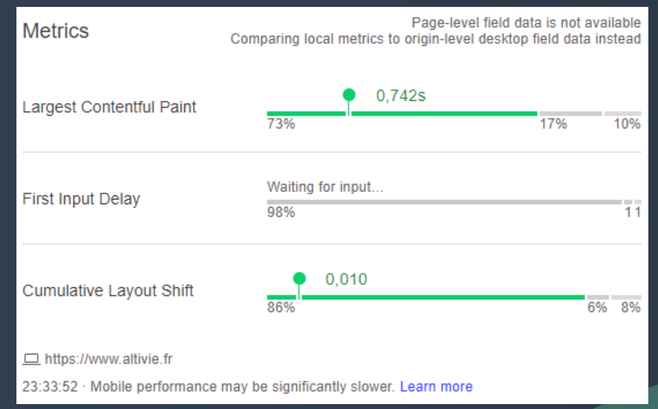
How to measure those metrics?

- Page Speed Insights - simplest way, get a full report
- Web Vitals Chrome Extension - during navigation, in your browser
- LightHouse in ChromeDevtools - generates lab data

Web Vitals via Chrome Extension



Others:

- Google Search Console
- Web-Vitals library - npm package (145 kB)
- Web Vitals Report - web app with Google Analytics plugin

Logging Web Vitals within the code with WebVitals package

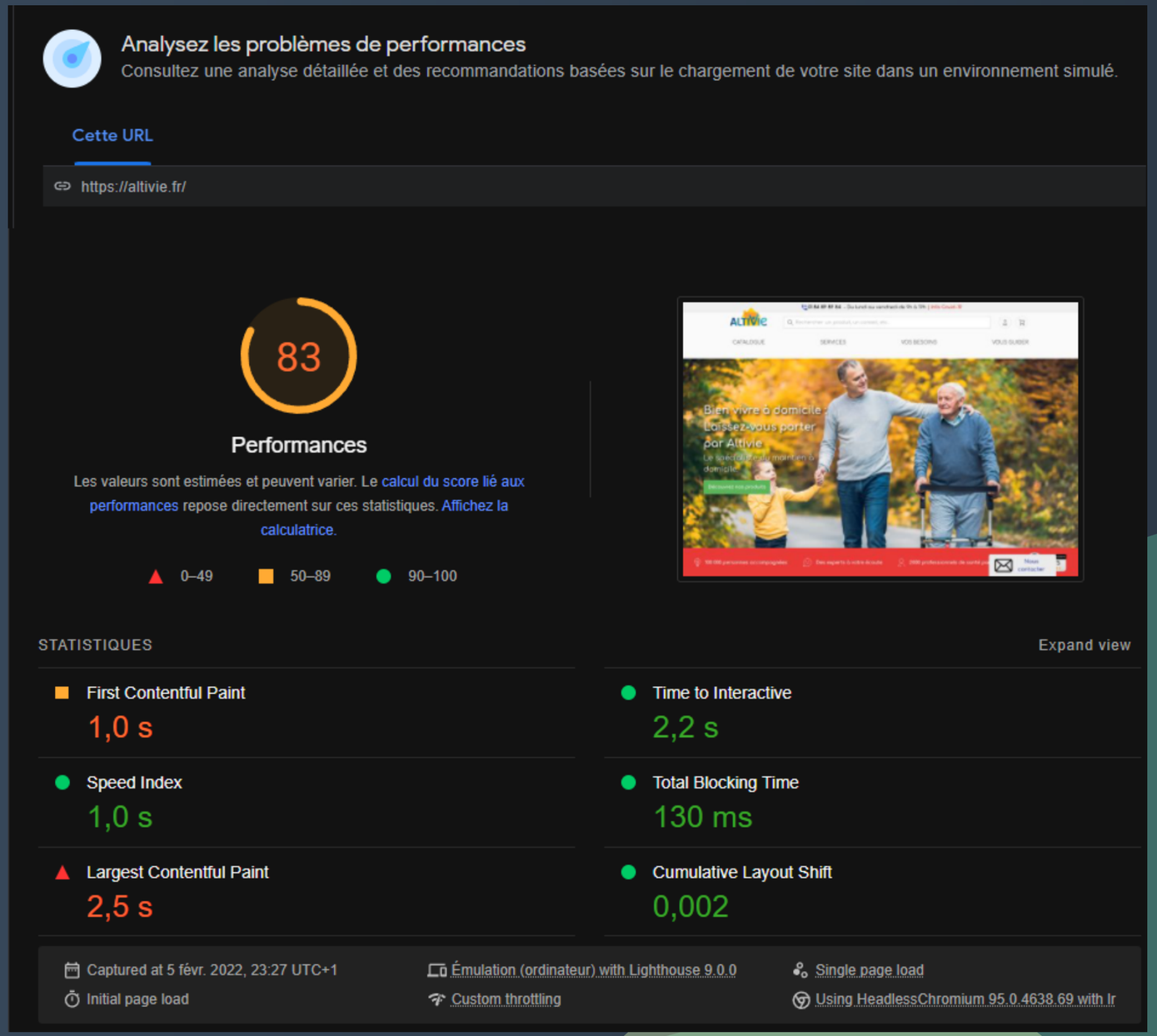
```
import { getLCP, getFID, getCLS } from 'web-vitals';

//
getCLS(console.log);
getFID(console.log);
getLCP(console.log);
```

Pagespeed Insights

Pagespeed report: Lab data (~LightHouse)

- LCP, TBT (equivalent to FID), CLS
- Time To Interactive (TTI, page fully interactive), First Contentful Paint, Speed Index (how quickly the content appears)



Pagespeed Insights

Pagespeed report: real users data

- FCP, FID, LCP, CLS

Resources

Web.dev Google Documentation

- Vitals
- Learn Web Vitals
- Metrics
- Improving load times
- Web Vitals patterns

Blog posts

- Efficiently loading 3rd-party JS
- Defer non-critical CSS

Videos

- Measure what matters 22/03/2021, Google Chrome Developers channel (8min)
- News on Core Web Vitals 18/05/2021, Google Chrome Developers channel (14min)

Others / Tools

- Page Speed Insights
- GitHub Web-vitals library
- Web.dev - Lab example on improving 3rd-party JS

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