React Norway



INP loves LoAF: Better Performance

Erwin Hofman

Pagespeed Consultant, RUMvision


Third parties - the ugly
They sometimes lie:
saying their JS runs in the background
or that it's loaded async
I WILL FIND YOU
AND I WILL


WEB PERF SUMMIT
WHAT IF IT'S A BIG HOAX AND WE CREATE A BETTER USER EXPERIENCE FOR NOTHING?
Mentimeter
More visitors
Lower bounce rate
More sign-ups
More conversions
More revenue
More search engine traffic


THE POWER OF
Core Web Vitals


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INP loves LoAF: Better Performance
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Mentimeter

Topics:

- web performance
- browser's main thread
- INP metric + LoAF
- DevTools & RUM

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What is your role?

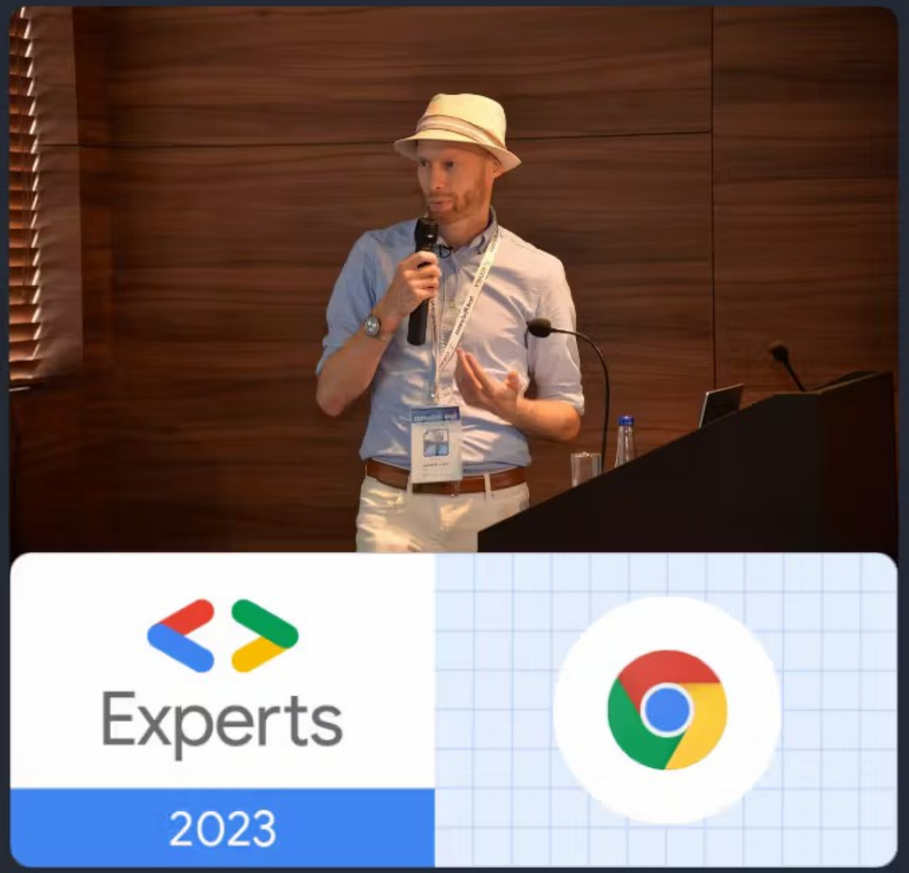
- 👍 technical (dev, consultant)
- 👎 less technical (marketer, product owner)
- ❓ other



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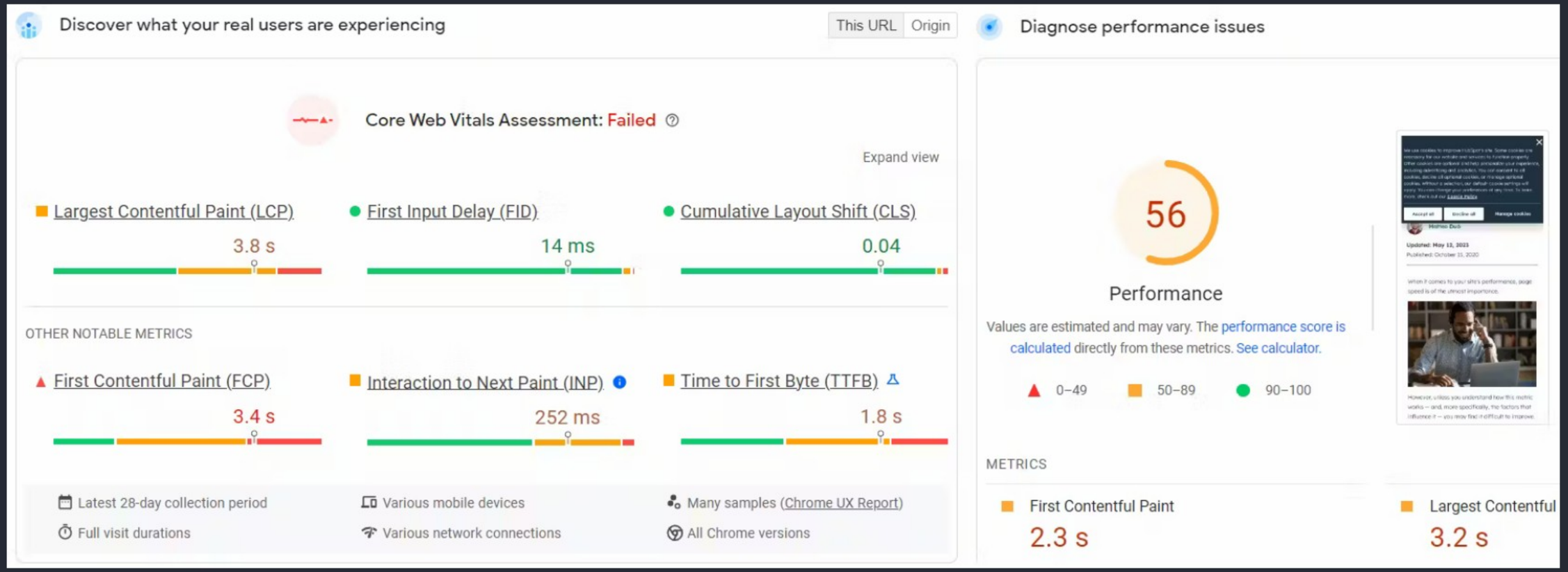
Who am I?

- Erwin Hofman
- developer (since 2001)
- consultant (audits & training)
- co-founder + CTO RUMvision
- Google Developer Expert



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Core Web Vitals (left) vs Lighthouse (right)

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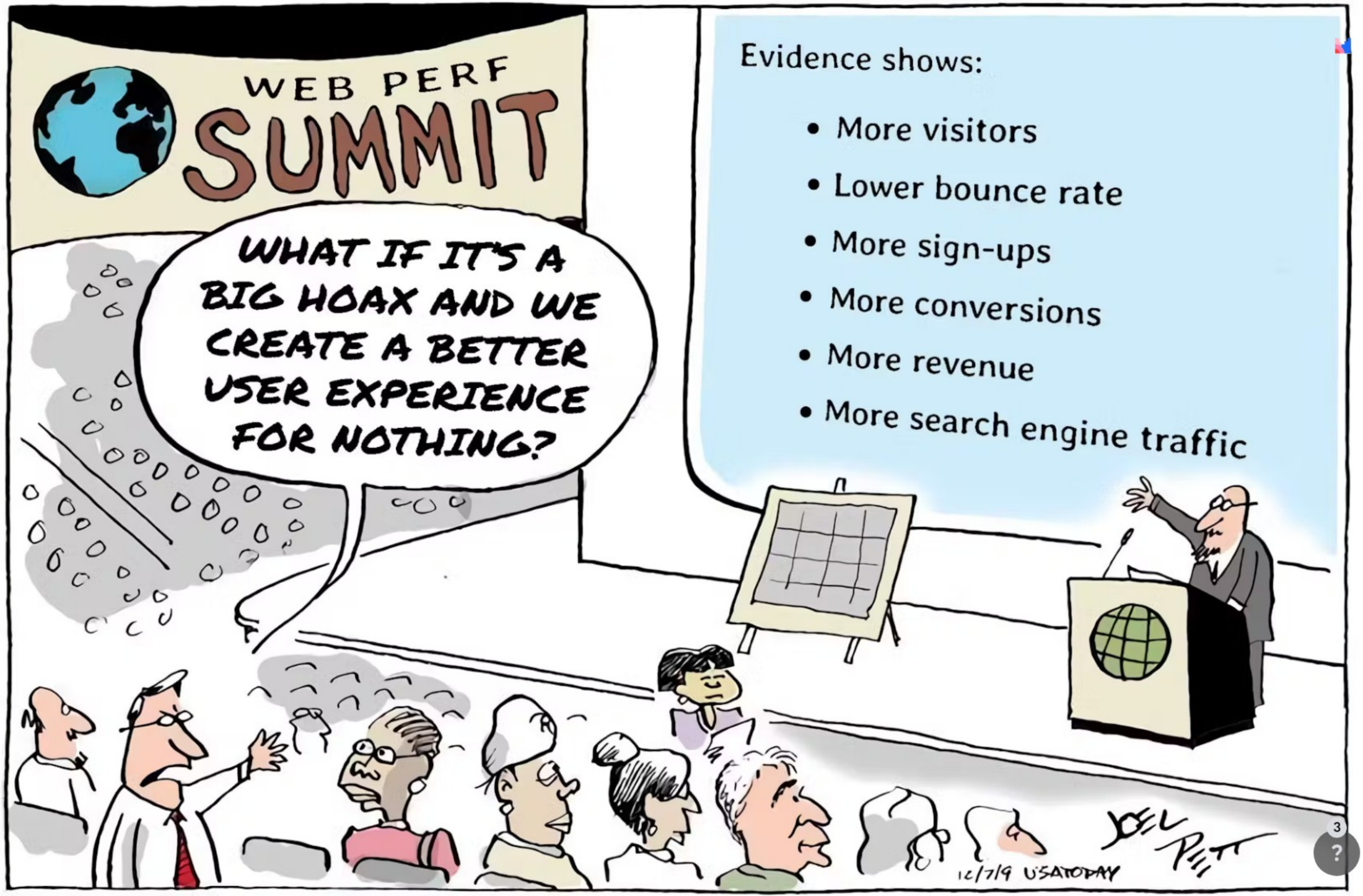

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GOOGLE
INP
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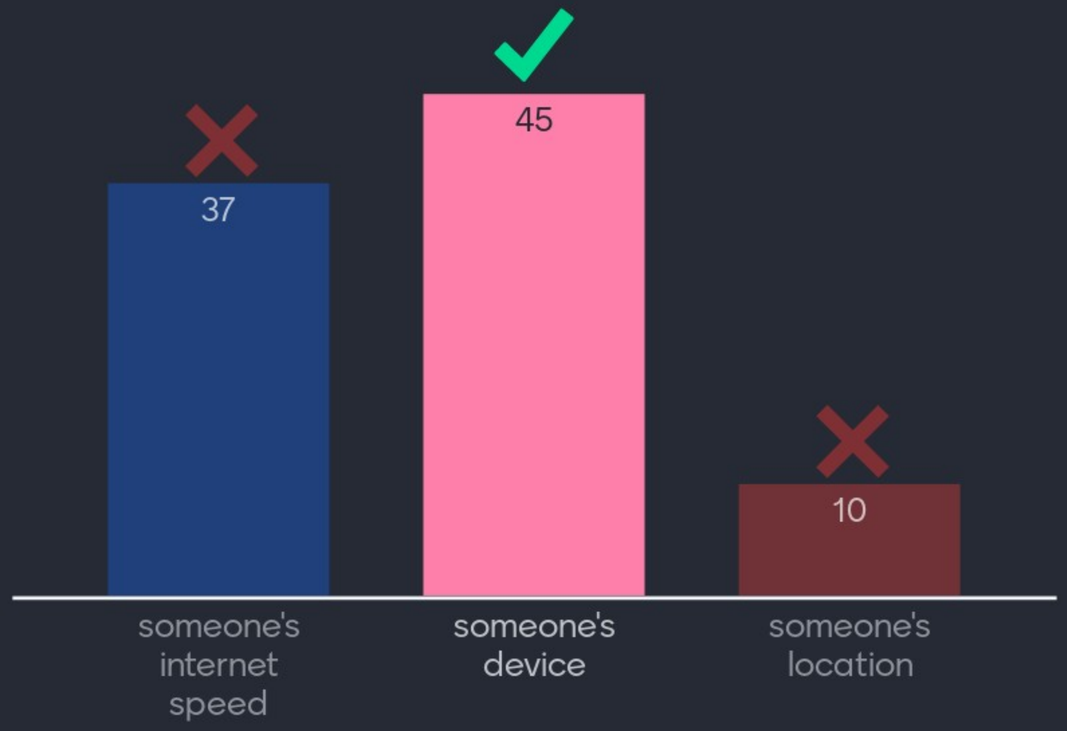
a new metric literally doesn't change a thing though!

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WEB PERF
SUMMIT
WHAT IF IT'S A BIG HOAX AND WE CREATE A BETTER USER EXPERIENCE FOR NOTHING?
Evidence shows:
• More visitors
• Lower bounce rate
• More sign-ups
• More conversions
• More revenue
• More search engine traffic
12/7/19 USATODAY
JOEL PETT

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What has the highest correlation with INP?



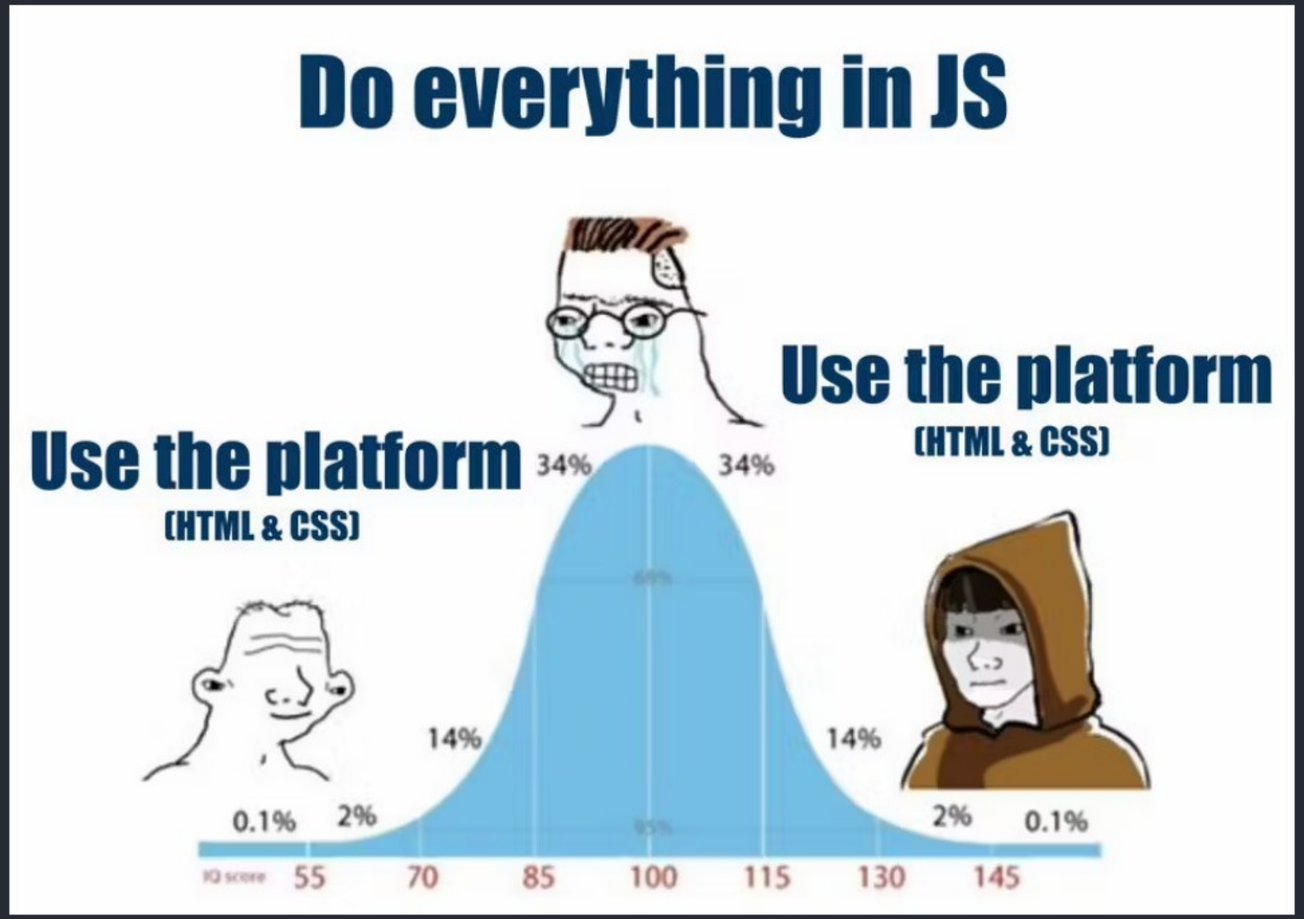
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2
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```
const h1Ref = useRef(null);
h1Ref.current = document.createElement('h1');
h1Ref.current.textContent = 'Hello, World!';
document.body.appendChild(h1Ref.current);

// will the <h1> be visible?

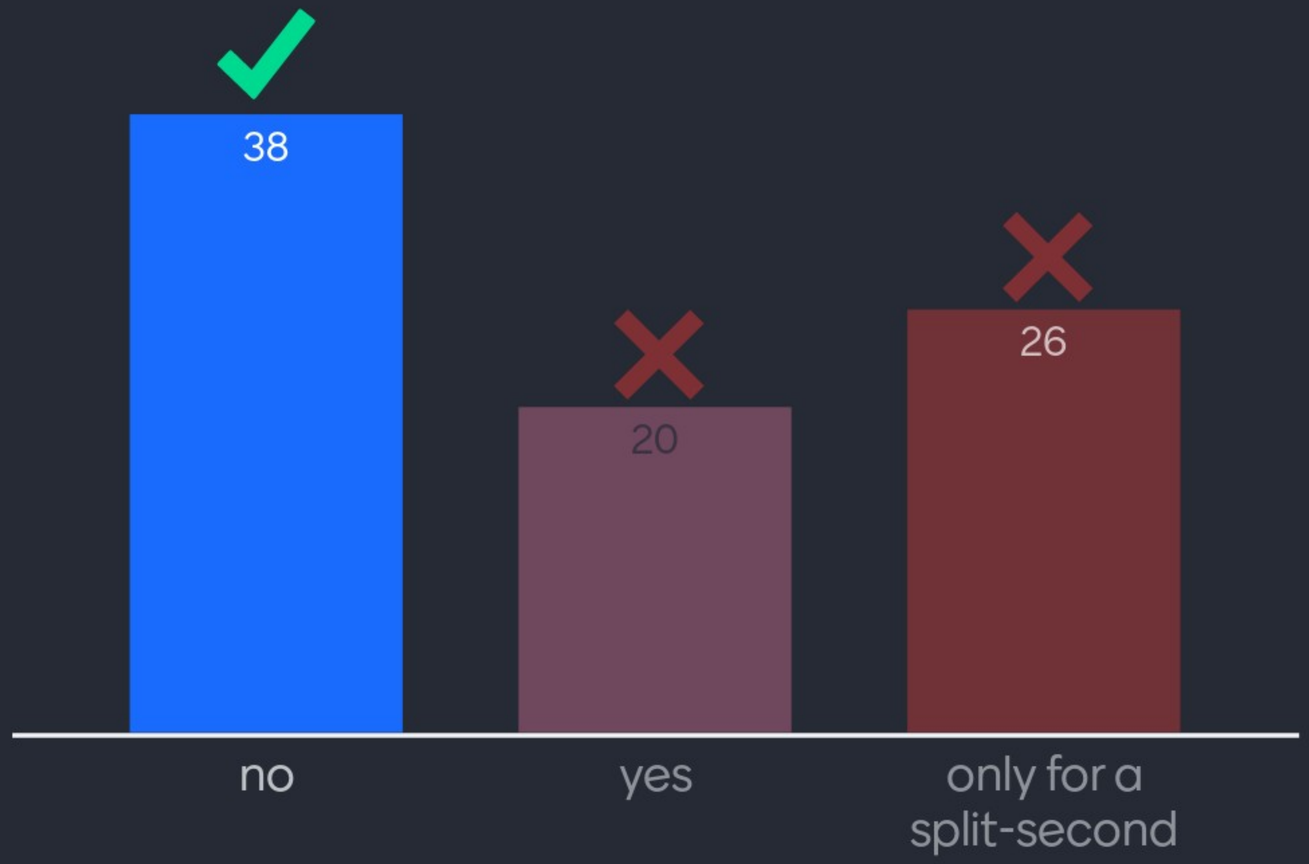
h1Ref.current.style.display = 'none';
```

Appending a <h1> to the body

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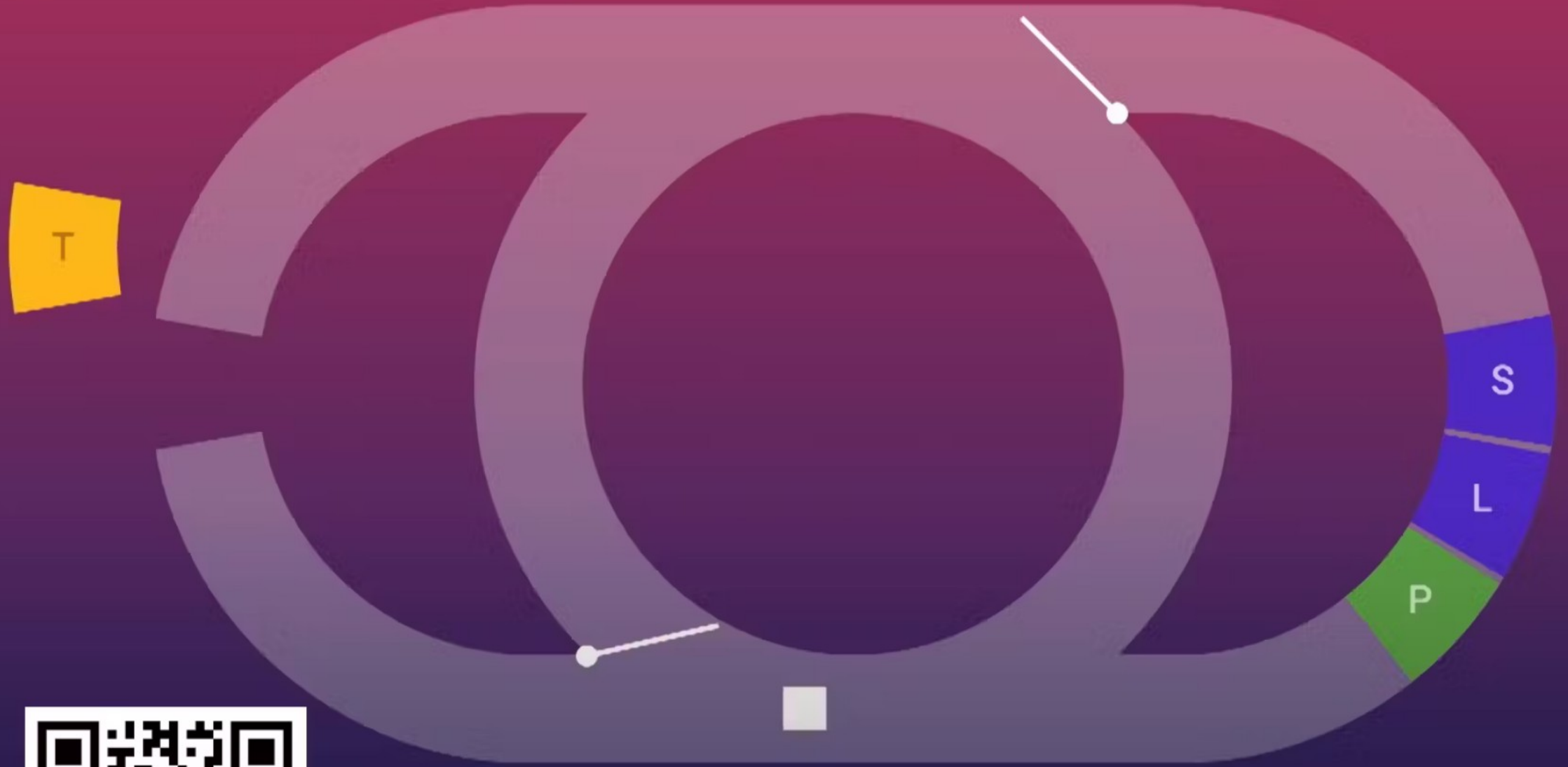
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Will the <h1> be visible?



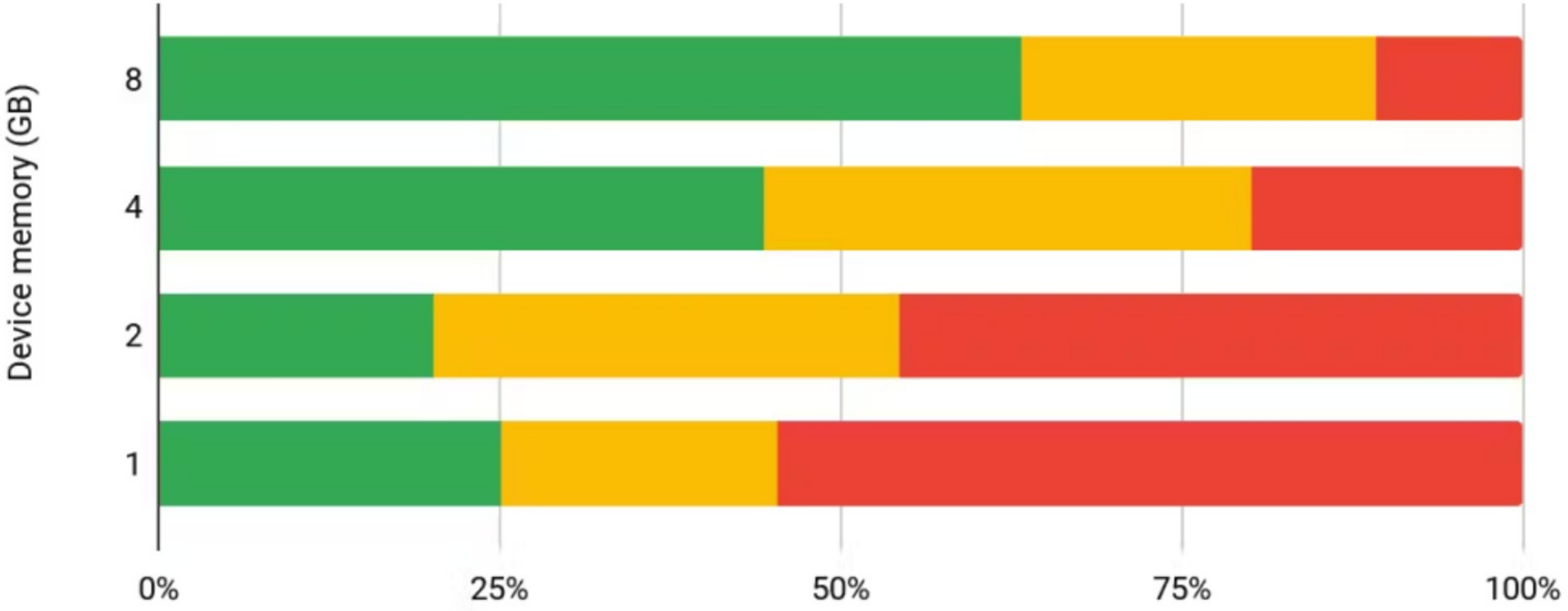
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youtu.be/cCOL7MC4PI0?t=508

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Google + rum VISION

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Lazyloads all JavaScript:

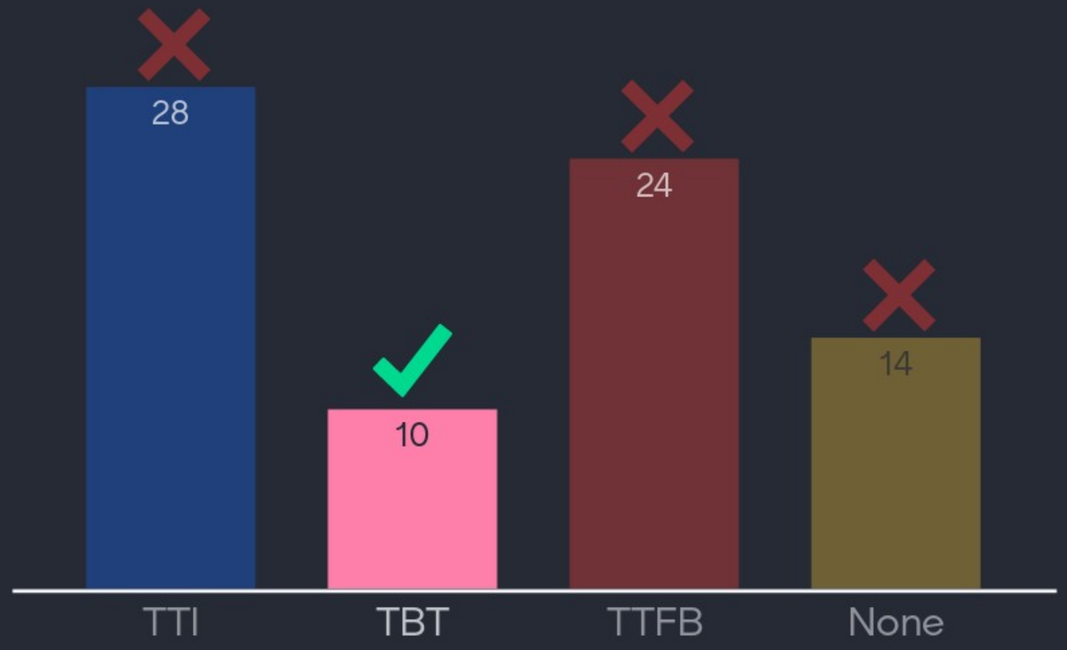





why do we fail
Core Web Vitals
Lighthouse showed
green when we launched
Lighthouse
doesn't equal real UX
nobody
told me that
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Which Lighthouse metric is closest to INP?

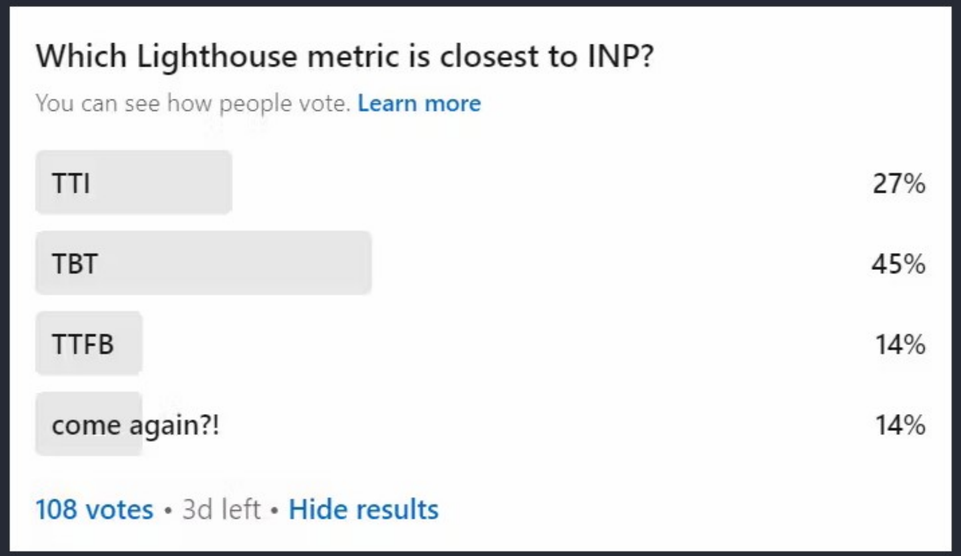


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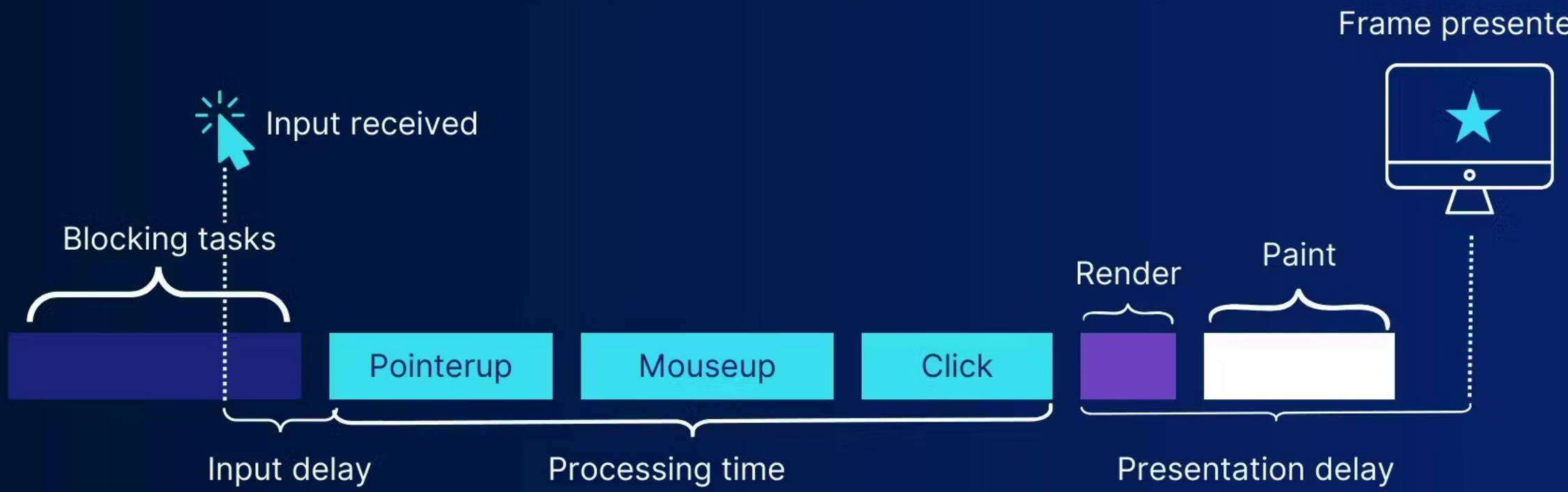
TBT vs INP

- TBT (Lighthouse)
- INP (Core Web Vitals)
- real users cannot be simulated



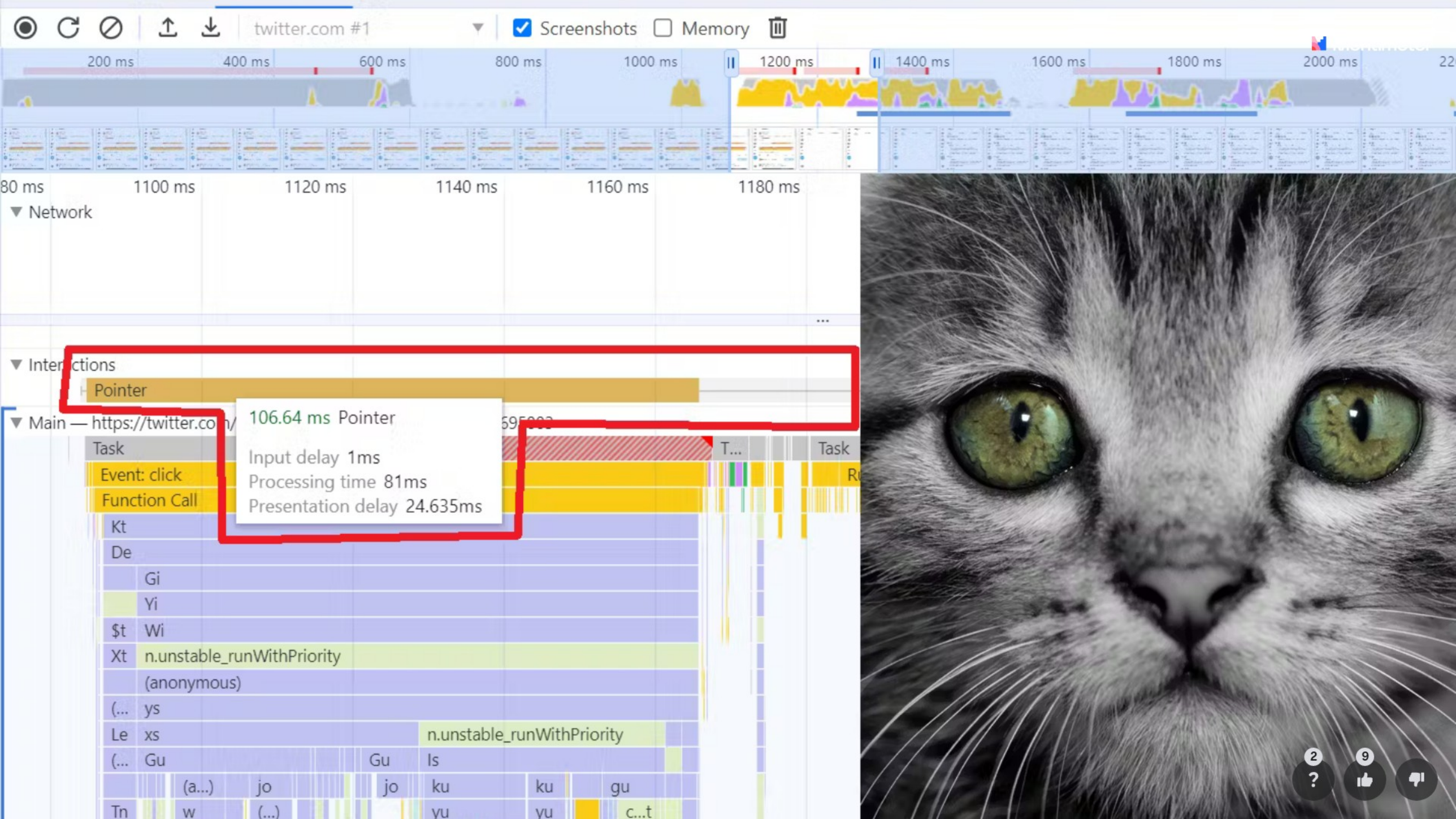
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The life of an interaction:



INP phases breakdown

22% input delay	36% processing time	42% presentation delay
56 ms	**89** ms	**104** ms


twitter.com #1
Screenshots
Memory
200 ms
400 ms
600 ms
800 ms
1000 ms
1200 ms
1400 ms
1600 ms
1800 ms
2000 ms
80 ms
1100 ms
1120 ms
1140 ms
1160 ms
1180 ms
Network
Interactions
Pointer
106.64 ms Pointer
Input delay 1ms
Processing time 81ms
Presentation delay 24.635ms
Main — https://twitter.com/
Task
Event: click
Function Call
Kt
De
Gi
Yi
$t Wi
Xt n.unstable_runWithPriority
(anonymous)
(... ys
Le xs
n.unstable_runWithPriority
(... Gu
Gu Is
(a...) jo
jo ku
ku gu
Tn w
(...) yu
yu c...t

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How to track INP?

- Lighthouse + DevTools
- but what applies to you might not apply to me
- So: RUM + LoAF API

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How to measure INP

INP can be measured both in the field and in the lab through a variety of tools.

> **Key point:** The best way to measure your website's INP is by gathering metrics from actual users in the field. If you're accustomed to relying on lab data for assessing performance, take some time to read Why lab and field data can be different (and what to do about it).

In the field

Ideally, your journey in optimizing INP will start with field data. At its best, field data from Real User Monitoring (RUM) will give you not only a page's INP value, but also contextual data that highlights what specific interaction was responsible for the INP value itself, whether the interaction occurred during or after page load, the type of interaction (click, keypress, or tap), and other valuable information.

#Google I/O

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Consider a Real User Monitoring (RUM) vendor

RUM is a technology that uses JavaScript on the web to get field data, which provides valuable insight into real user experiences. Using one can save you time, and provide rich and detailed visualizations of aggregated real user performance data—including INP!

CLOUDFLARE

Blue Triangle / Friction Quantified

SpeedCurve

Akamai

RUM VISION



provide services that
can do this work for you.

16:22 / 17:30

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New field insights for debugging INP

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```
// Positional arguments
new Conference('JavaScript', 'Norway');

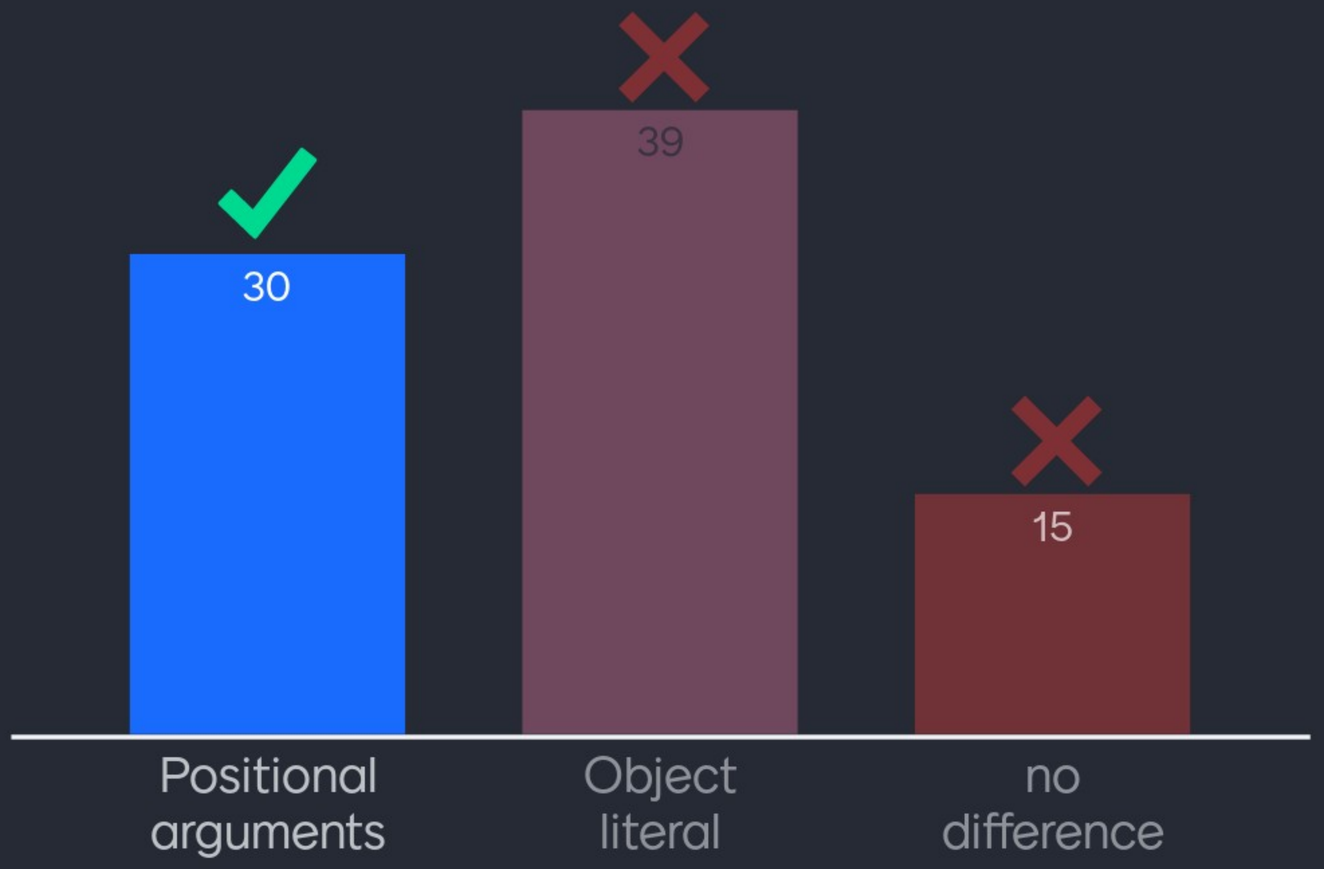
// Object literal
new Conference({lang:'JavaScript',country:'Norway'});
```

Exact third party impact

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Which is faster?



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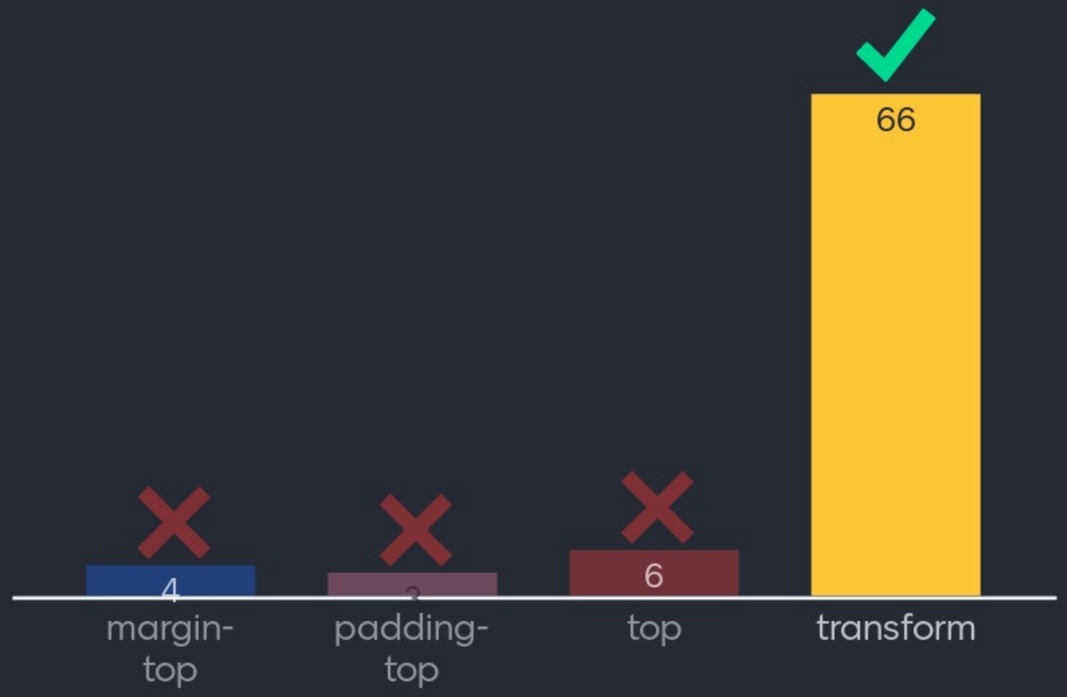
Optimizing performance

- create all your objects with the exact same shape (types & parameter order)
- as V8 will benefit, so your order of React component props matters as well
- { ...spread } operator = convenient but creates a new object every time
- styled components for everything = doubling the cost of rendering the whole app

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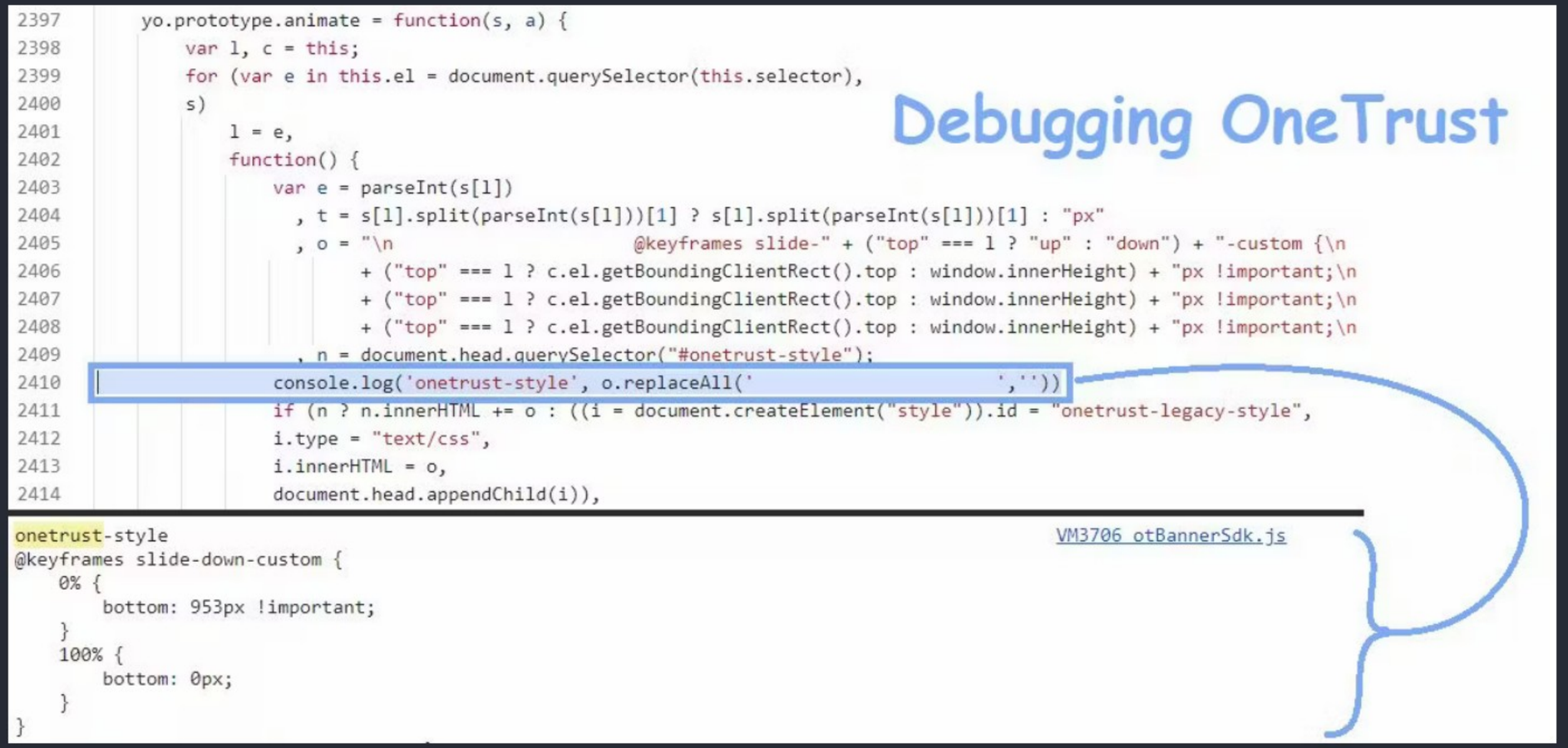
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Best CSS property to animate elements?



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OneTrust being bad for performance

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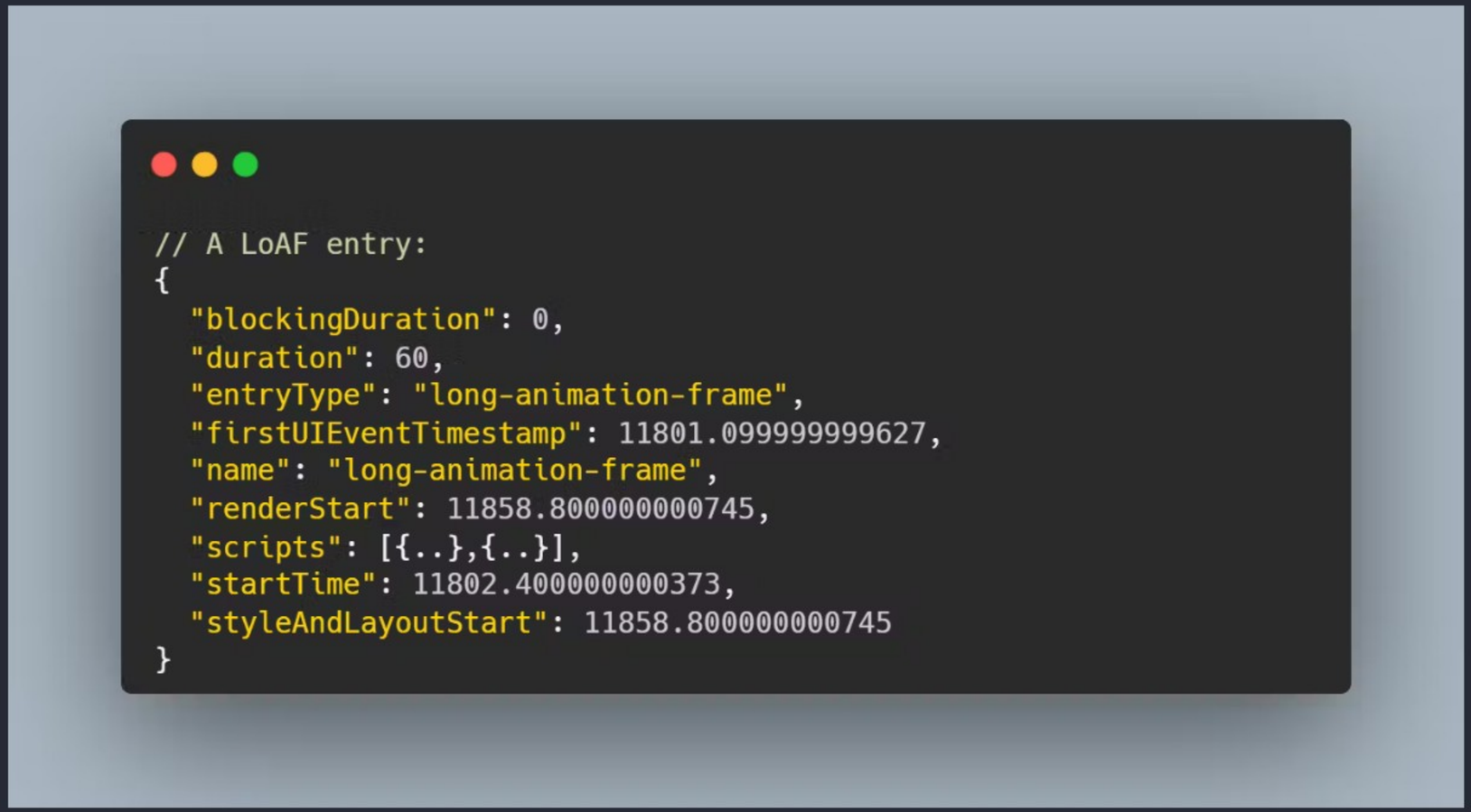
```
const observer = new PerformanceObserver((list) => {
  console.log(list.getEntries());
});

observer.observe({ type: 'long-animation-frame', buffered: true });
```

Observe LoAFs (see **buffered** flag)

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```
// A LoAF entry:
{
  "blockingDuration": 0,
  "duration": 60,
  "entryType": "long-animation-frame",
  "firstUIEventTimestamp": 11801.099999999627,
  "name": "long-animation-frame",
  "renderStart": 11858.800000000745,
  "scripts": [{..},{..}],
  "startTime": 11802.400000000373,
  "styleAndLayoutStart": 11858.800000000745
}
```

A LoAF entry

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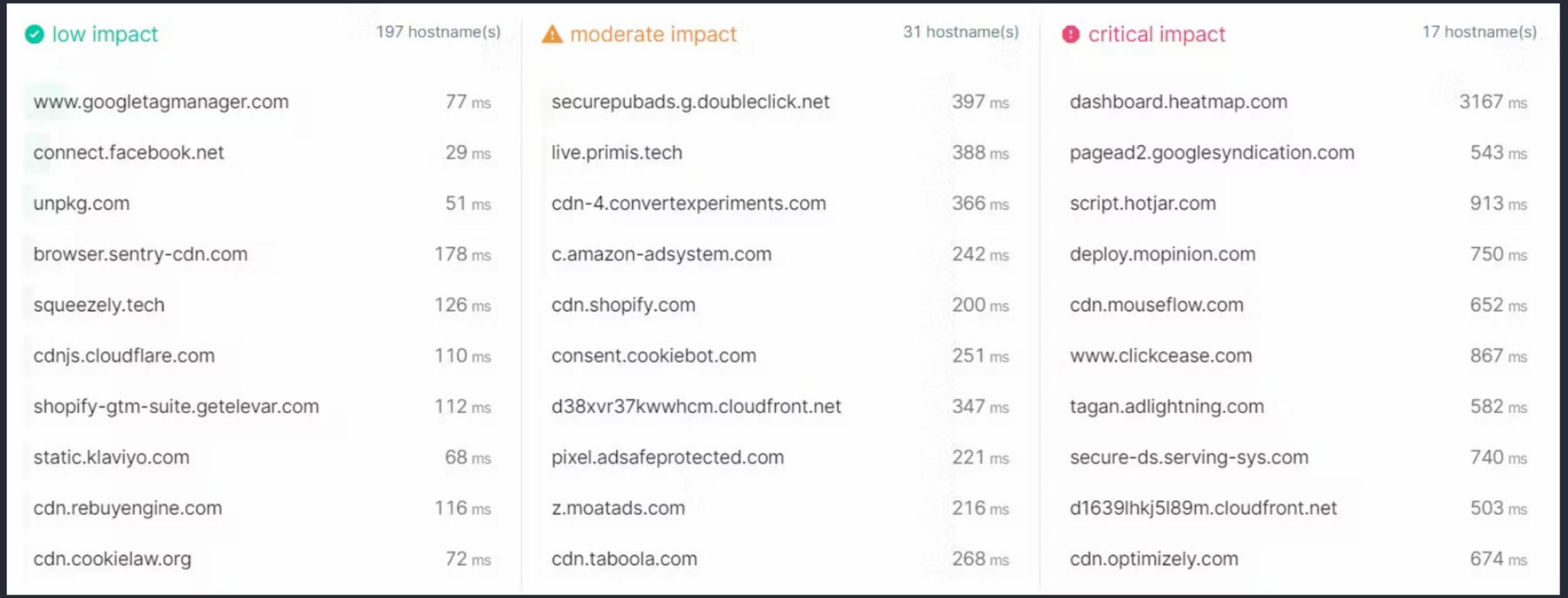


```
{
  ..
  "scripts": [
    {
      ..
      "duration": 45,
      "invoker": "DOMWindow.onclick",
      "invokerType": "event-listener",
      "sourceURL": "https://web.dev/js/index-ffde4443.js",
      "sourceFunctionName": "myClickHandler",
      "sourceCharPosition": 17796,
      ..
    }
  ],
  ..
}
```

Array of script-entries that contributed to a long animation frame

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low impact	197 hostname(s)	moderate impact	31 hostname(s)	critical impact	17 hostname(s)
www.googletagmanager.com	77 ms	securepubads.g.doubleclick.net	397 ms	dashboard.heatmap.com	3167 ms
connect.facebook.net	29 ms	live.primis.tech	388 ms	pagead2.googlesyndication.com	543 ms
unpkg.com	51 ms	cdn-4.convertexperiments.com	366 ms	script.hotjar.com	913 ms
browser.sentry-cdn.com	178 ms	c.amazon-adsystem.com	242 ms	deploy.mopinion.com	750 ms
squeezely.tech	126 ms	cdn.shopify.com	200 ms	cdn.mouseflow.com	652 ms
cdnjs.cloudflare.com	110 ms	consent.cookiebot.com	251 ms	www.clickcease.com	867 ms
shopify-gtm-suite.getelevar.com	112 ms	d38xvr37kwwhcm.cloudfront.net	347 ms	tagan.adlightning.com	582 ms
static.klaviyo.com	68 ms	pixel.adsafeprotected.com	221 ms	secure-ds.serving-sys.com	740 ms
cdn.rebuyengine.com	116 ms	z.moatads.com	216 ms	d1639lhkj5l89m.cloudfront.net	503 ms
cdn.cookielaw.org	72 ms	cdn.taboola.com	268 ms	cdn.optimizely.com	674 ms

Exact third party impact by RUMvision

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Links & more

- linkedin.com/in/erwinhofman/
- erwinhofman.com/inp-demo/
- github.com/imteekay/web-performance-research
- romgrk.com/posts/optimizing-javascript
- vercel.com/blog/demystifying-inp-new-tools-and-actionable-insights
- developer.chrome.com/docs/web-platform/long-animation-frames

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