

# **Core Web Vitals**

Case study



edition.cnn.com



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Edition



**WATCH CNN:** UK live stream | **US ELECTIONS:** Latest on the transition | Misinformation watch | Results map | **TRENDING:** Meghan, Duchess of Sussex | Dominici

# Biden attempts a repudiation of Trump



**Biden's strategy is already coming into conflict with Trump's nihilistic conservatism that is likely to dictate the GOP's strategy even when he's left the Oval Office**

**LIVE UPDATES:** Fauci confirms he's been talking to Biden's staff

Xi Jinping finally congratulates Biden

**Opinion:** Biden team inherits Trump's ocean of troubles

▶ Biden says he would meet with Trump if Trump asked

## Top stories



### Soccer legend Diego Maradona dead at 60

- How Diego Maradona redefined football
- 'Goal of the Century': Maradona's 1986 magic



### Biden piles pressure on Boris Johnson at Brexit crunch time

- Britain's final Brexit choice could prolong the



### He's an ex-Proud Boy. Here's what he says happens within the group's ranks

**COVID UPDATES:** Belgium risks becoming 'an island of bankrupt shops'

Meghan, Duchess of Sussex, reveals miscarriage

Ghislaine Maxwell is woken up in her cell every 15 minutes to see if 'she is breathing'

▶ Here are the most hopeful Covid-19 vaccine candidates globally

How the market rally defied a pandemic

▶ See how luxury hotels are doing across the US during the pandemic

Europe still biggest contributor to Covid



**+30%**

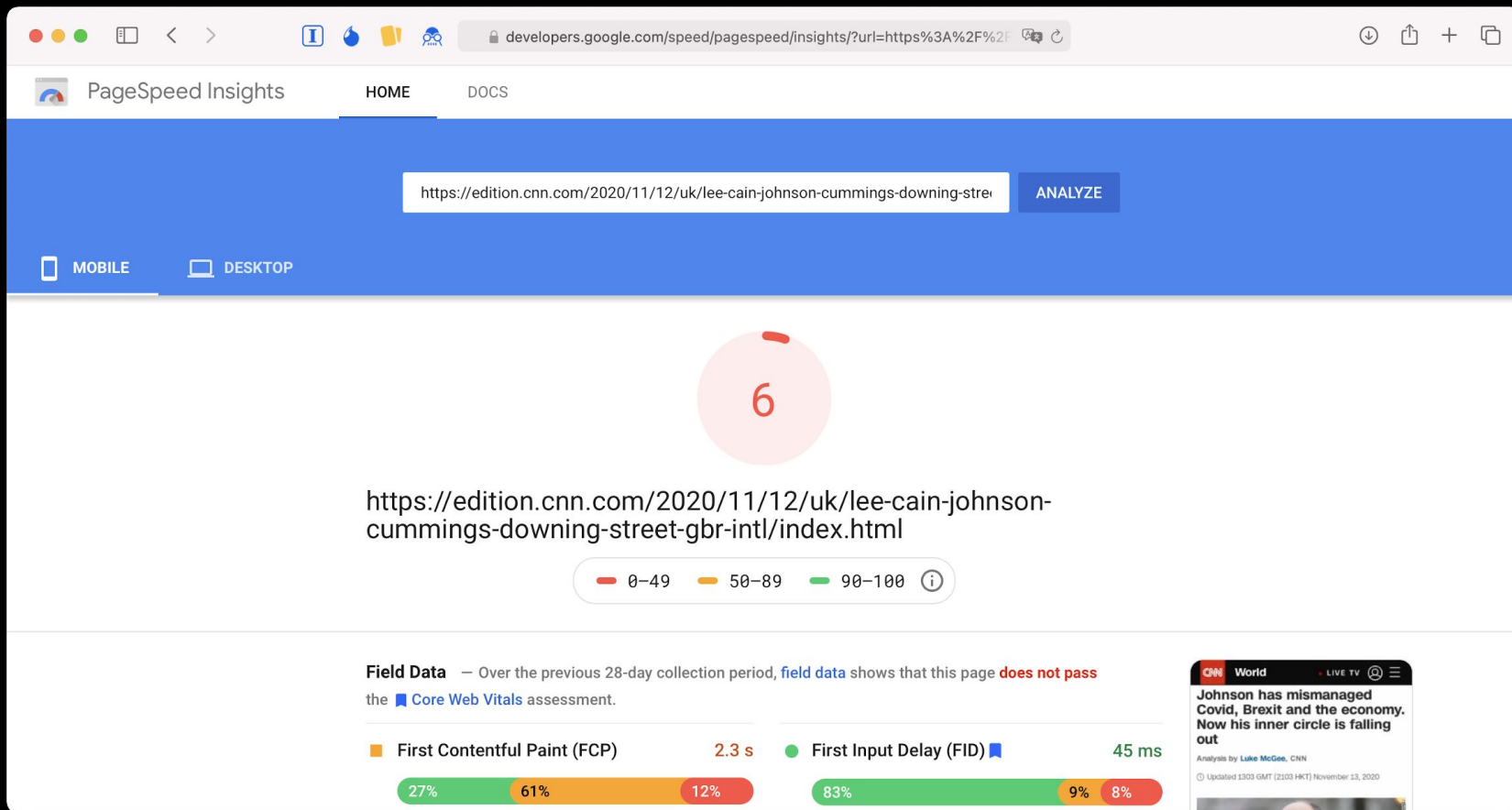
engagement



**+80%**

traffic

— [wpostats.com](https://wpostats.com)

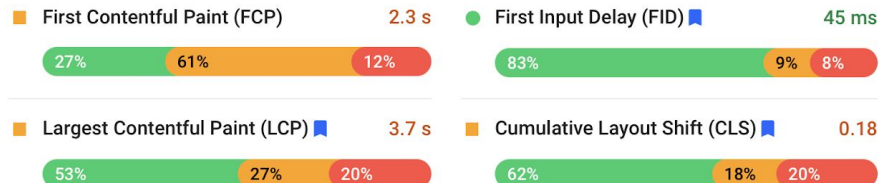




HOME DOCS

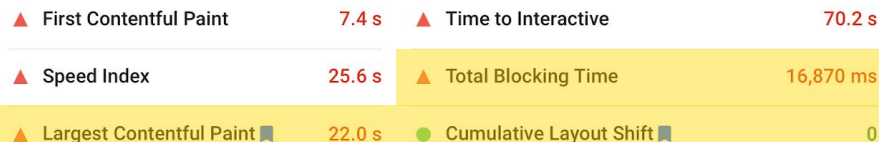
MOBILE DESKTOP

**Field Data** — Over the previous 28-day collection period, [field data](#) shows that this page **does not pass** the [Core Web Vitals](#) assessment.



☐ [Show Origin Summary](#)

### Lab Data



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

**CNN World** LIVE TV

**Johnson has mismanaged Covid, Brexit and the economy. Now his inner circle is falling out**

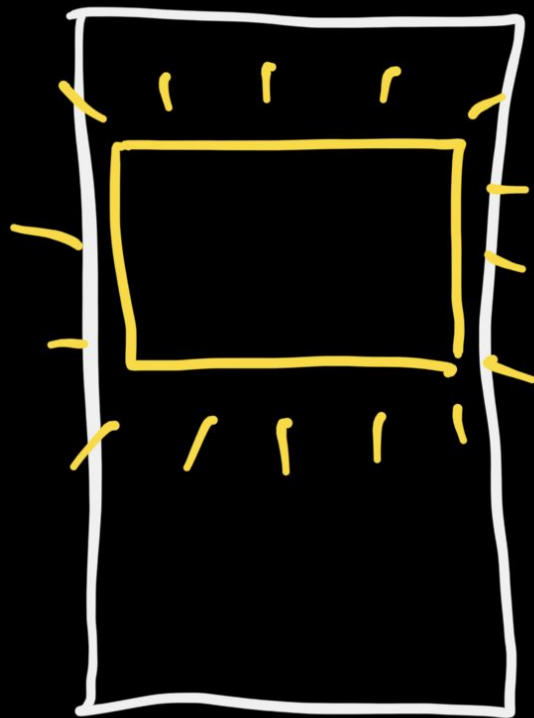
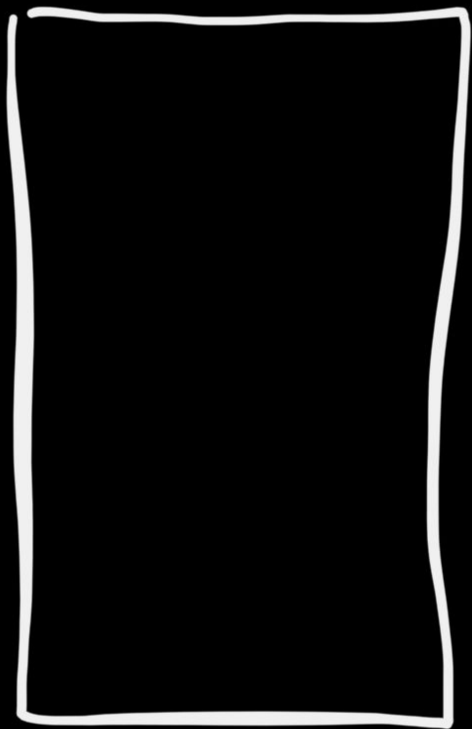
Analysis by [Luke McGee](#), CNN

Updated 13:03 GMT (22:03 HKT) November 13, 2020



**London (CNN)** — The UK is deep in its second wave of Covid-19 at the same time as Brexit enters its final act. This might seem enough to keep its leadership occupied.

***LCP***





Server  
response  
time



Render-  
blocking  
resources



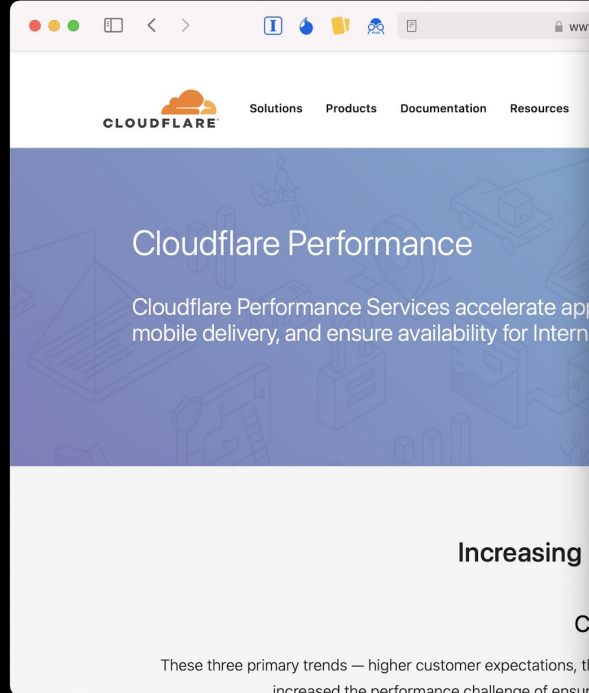
Late hero  
image



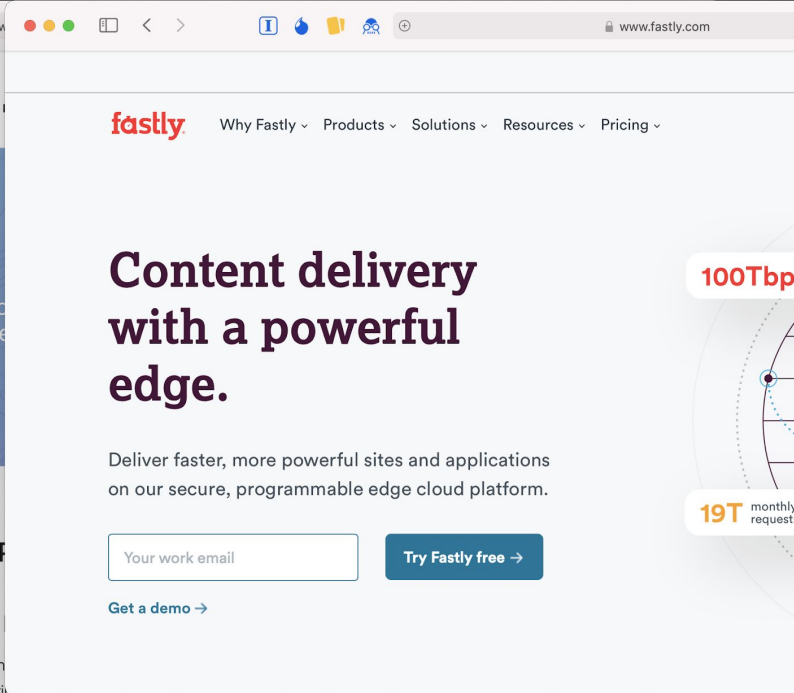
# CDN

Server  
response  
time

 [bit.ly/  
holy-perf-links](https://bit.ly/holy-perf-links)



The screenshot shows the Cloudflare homepage. At the top is the Cloudflare logo and a navigation menu with links for Solutions, Products, Documentation, and Resources. The main header area has a blue background with the text "Cloudflare Performance" and a sub-header stating "Cloudflare Performance Services accelerate app mobile delivery, and ensure availability for Internet". Below this, the text "Increasing Performance" is partially visible. At the bottom, a paragraph begins with "These three primary trends — higher customer expectations, th".



The screenshot shows the Fastly homepage. At the top is the Fastly logo and a navigation menu with links for Why Fastly, Products, Solutions, Resources, and Pricing. The main content area features the headline "Content delivery with a powerful edge." followed by the text "Deliver faster, more powerful sites and applications on our secure, programmable edge cloud platform." Below this is a form for "Your work email" and a "Try Fastly free →" button. A "Get a demo →" link is also present. On the right side, there is a circular graphic with two data points: "100Tbp" and "19T monthly request".



# Edge functions

Run your server-side logic in a CDN

Server  
response  
time

- Cloudflare Workers
- Lambda@Edge
- Netlify Functions
- (& more)

 [bit.ly/  
holy-perf-links](https://bit.ly/holy-perf-links)



Server  
response  
time



Render-  
blocking  
resources



Late hero  
image

```
<head>  
  <link rel="stylesheet"  
        href="style.css">  
  
  <script src="script.js">  
  
</head>
```



```
<head>
```

```
  <link rel="stylesheet"  
        href="style.css">
```

→ no render until it downloads

```
  <script src="script.js">
```

```
</head>
```

# Main Page

From Wikipedia, the free encyclopedia  
[Jump to navigation](#) [Jump to search](#)

Welcome to **Wikipedia**,  
the [free encyclopedia](#) that [anyone can edit](#).  
[6,196,606](#) articles in [English](#)

- [The arts](#)
- [History](#)
- [Society](#)
- [Biography](#)
- [Mathematics](#)
- [Technology](#)
- [Geography](#)
- [Science](#)
- [All portals](#)

## From today's featured article



Territorial control in the caliphate c. 686, during the [Second Fitna](#)

**Marwan I** (c. 625 – 685) was the fourth [Umayyad](#) caliph, ruling for less than a year in 684–685. He was the [secretary](#) of his cousin Caliph [Uthman](#) (r. 644–656). During the [rebel siege of Uthman's house](#), Marwan was wounded and the caliph was slain. Marwan considered [Talha ibn Ubayd Allah](#), a companion of the prophet [Muhammad](#), culpable in the death of Uthman, and killed him in the [Battle of the Camel](#) in 656. Marwan later served as governor of [Medina](#) under his distant kinsman Caliph [Mu'awiya I](#) (r. 661–680), founder of the Umayyad Caliphate. After the reigns of [Yazid I](#) (r. 680–683) and [Mu'awiya II](#) (r. 683–684), the tribal nobility of [Syria](#), led by [Ibn Bahdal](#) of the [Banu Kalb](#), elected Marwan caliph. He reasserted Umayyad rule over [Egypt](#), [Palestine](#) and northern Syria, and dispatched an expedition to reconquer Iraq, but died while it was underway. His son [Abd al-Malik](#) was his designated successor, and the Umayyads continued to rule until 750. ([Full article...](#))

Recently featured:

"[A Nice Day for a Posh Wedding](#)"  
[French battleship \*Iéna\*](#)  
[James Humphreys \(pornographer\)](#)

[Archive](#)  
[By email](#)

## In the news

[COVID-19 pandemic](#)  
[Disease](#)  
[Virus](#)  
[By location](#)  
[Impact](#)  
[Portal](#)

- Argentine footballer [Diego Maradona](#) (*pictured*) dies at the age of 60.
- [Douglas Stuart](#)'s debut novel [Shuggie Bain](#) wins the [Booker Prize](#).
- The [National Science Foundation](#) announces the decommissioning of the [Arecibo Observatory radio telescope](#) in Puerto Rico.
- The [Brereton Report](#) is released, documenting evidence of 39 unlawful killings by [Australian Defence Force](#) personnel during the [war in Afghanistan](#).



Diego Maradona

[Ongoing:](#)

```
<head>
```

```
  <link rel="stylesheet"  
        href="style.css">
```

```
  <script src="script.js">
```

→ no render until it downloads  
and executes

```
</head>
```

```
<head>
```

```
  <link rel="stylesheet"  
        href="style.css">
```

```
  <script src="script.js">
```

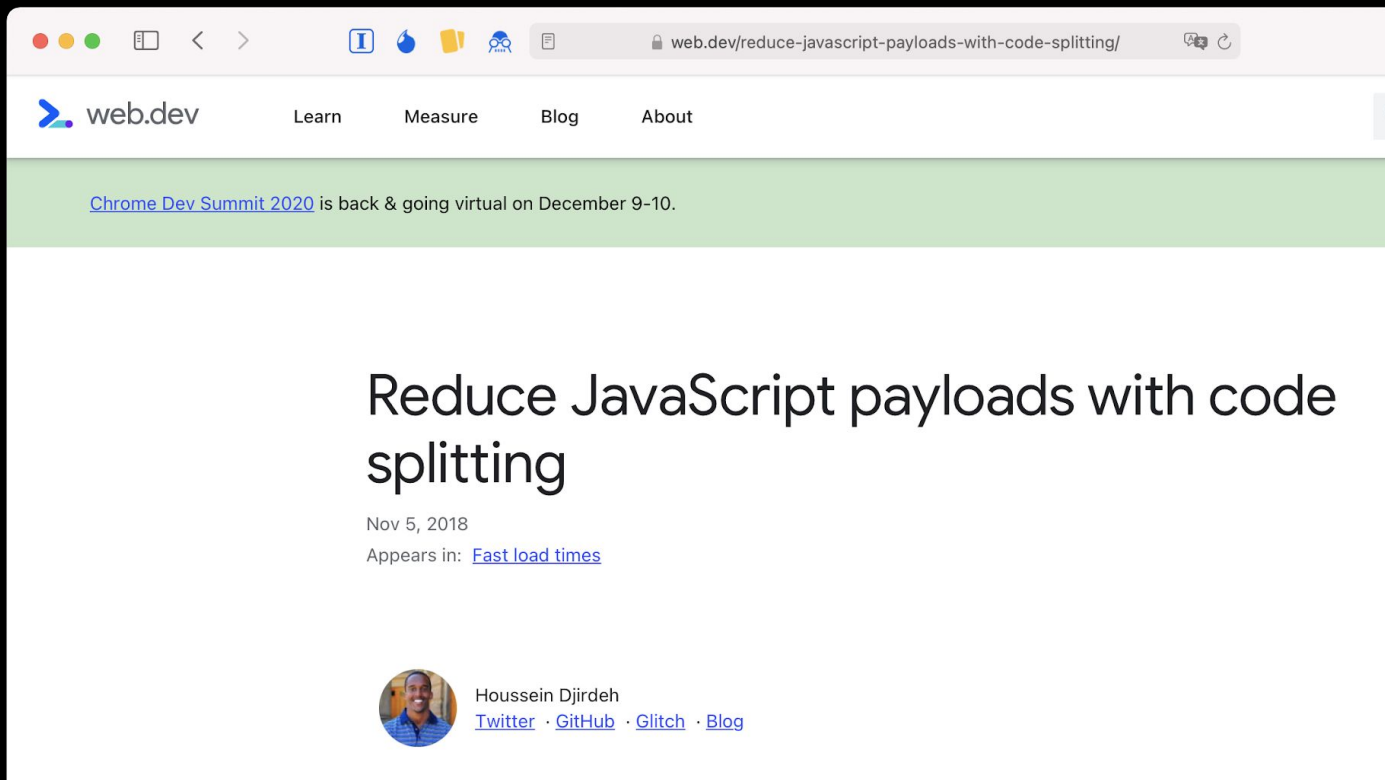
```
</head>
```



Render-  
blocking  
resources

 bit.ly/  
holy-perf-links

# Code splitting





Render-  
blocking  
resources

 bit.ly/  
holy-perf-links

# Bundle audit



The screenshot shows a Twitter thread on a mobile interface. The search bar at the top contains "@iamakulov bundle duplicates". The thread is by Ivan Akulov (@iamakulov) dated 18.05.20. The text of the tweet reads: "Okay, let's talk about **bundle duplicates**. A common issue in JS bundles is duplicated dependencies. E.g., lodash, core-js, some polyfill libs are frequently bundled multiple times. Here's how to detect and solve this issue: a thread ↓". Below the text is a large, complex treemap visualization of a JavaScript bundle. The treemap is divided into two main sections: "node\_modules" on the left and "js" on the right. The "node\_modules" section shows various sub-packages like "react-dom", "core-js", and "lodash". The "js" section shows application-specific files like "index.js", "index.tsx", and "icons.tsx". Overlaid on the treemap is the text "Bundle duplicates" in a large, bold, black font.

@iamakulov bundle duplicates

Top Latest People Photos Videos

Ivan Akulov @iamakulov · 18.05.20

Okay, let's talk about **bundle duplicates**.

A common issue in JS bundles is duplicated dependencies. E.g., lodash, core-js, some polyfill libs are frequently bundled multiple times.

Here's how to detect and solve this issue: a thread ↓

node\_modules js

Bundle duplicates



Render-  
blocking  
resources

# async & defer

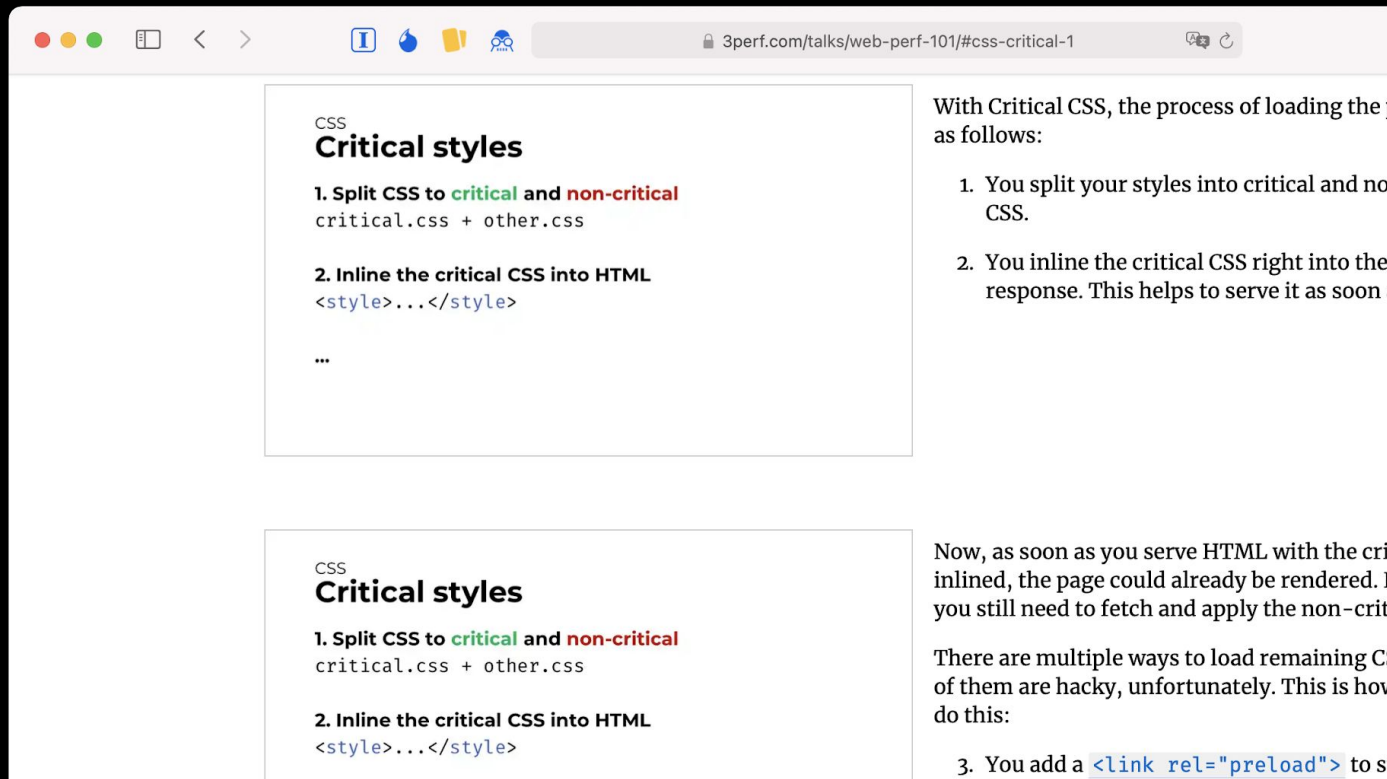
```
<head>  
  <script src="script.js" defer>  
    → not render-blocking anymore  
</head>
```



Render-  
blocking  
resources

 [bit.ly/  
holy-perf-links](https://bit.ly/holy-perf-links)

# Critical CSS



The screenshot shows a web browser window with the address bar displaying `3perf.com/talks/web-perf-101/#css-critical-1`. The slide content is as follows:

CSS

## Critical styles

1. Split CSS to **critical** and **non-critical**  
`critical.css + other.css`
2. Inline the critical CSS into HTML  
`<style>...</style>`
- ...

CSS

## Critical styles

1. Split CSS to **critical** and **non-critical**  
`critical.css + other.css`
2. Inline the critical CSS into HTML  
`<style>...</style>`

With Critical CSS, the process of loading the CSS as follows:

1. You split your styles into critical and non-critical CSS.
2. You inline the critical CSS right into the HTML response. This helps to serve it as soon as possible.

Now, as soon as you serve HTML with the critical CSS inlined, the page could already be rendered. However, you still need to fetch and apply the non-critical CSS.

There are multiple ways to load remaining CSS. Some of them are hacky, unfortunately. This is how you can do this:

3. You add a `<link rel="preload">` to the HTML





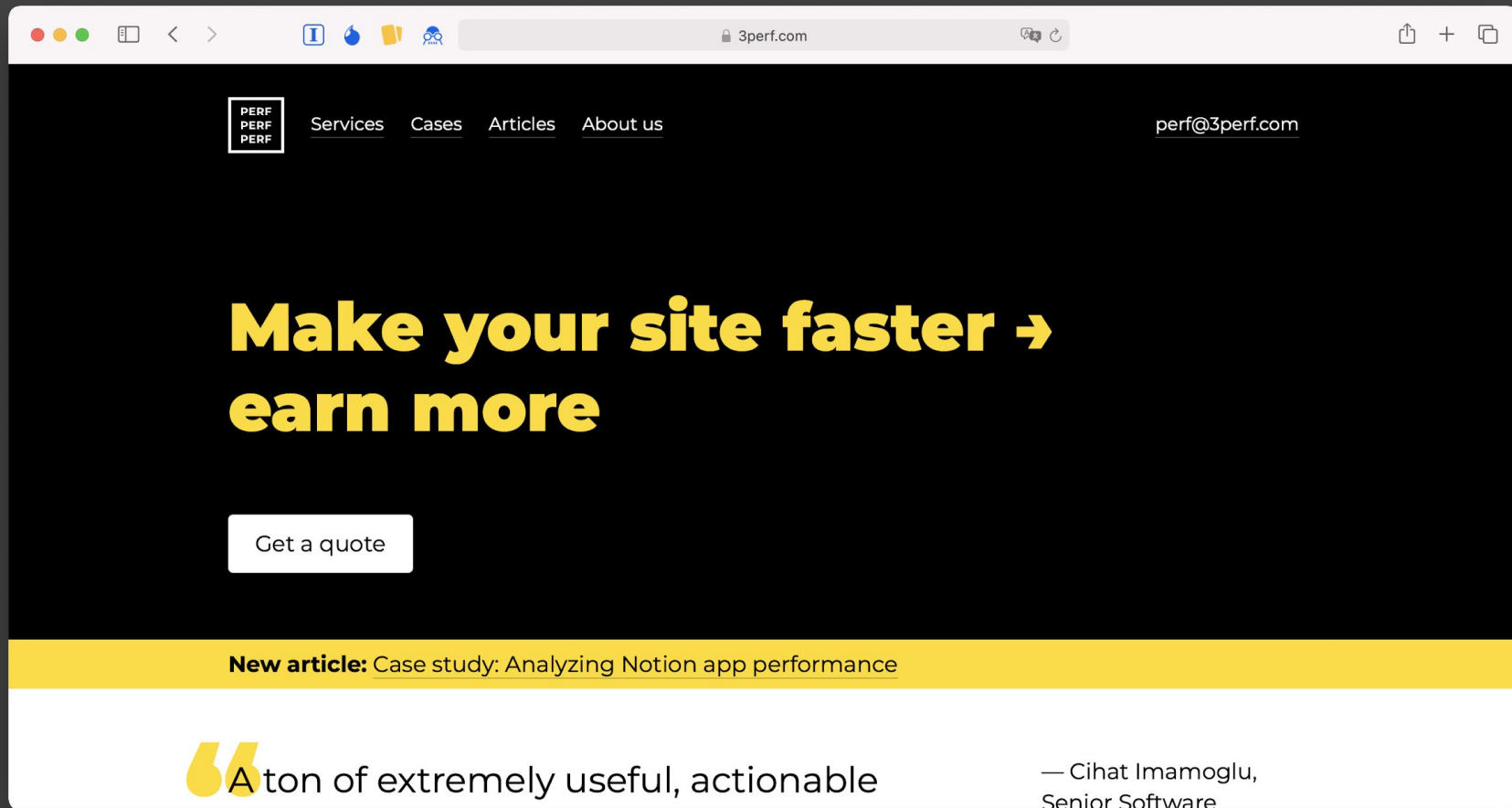
Render-  
blocking  
resources

# React

**Static site:** keep React only on the server side

- ReactDOMServer.renderToStaticMarkup()
- gatsby-plugin-no-javascript
- gatsby-plugin-no-javascript-utils

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holy-perf-links](https://bit.ly/holy-perf-links)



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[Cases](#)

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[perf@3perf.com](mailto:perf@3perf.com)

# Make your site faster → earn more

Get a quote

**New article:** [Case study: Analyzing Notion app performance](#)

“A ton of extremely useful, actionable

— Cihat Imamoglu,  
Senior Software



# React

**Dynamic site:** React → Preact

Render-  
blocking  
resources

 [bit.ly/  
holy-perf-links](https://bit.ly/holy-perf-links)



Server  
response  
time



Render-  
blocking  
resources



Late hero  
image





Late hero  
image

# Typical stuff

- Image compression
- webp versions
- `<img srcset>`

## Tools:

- CDNs: Cloudinary, Imgix
- Self-hosted proxies: imgproxy
- Gatsby: gatsby-image
- Next.js: next/image
- Manual: Squoosh.app

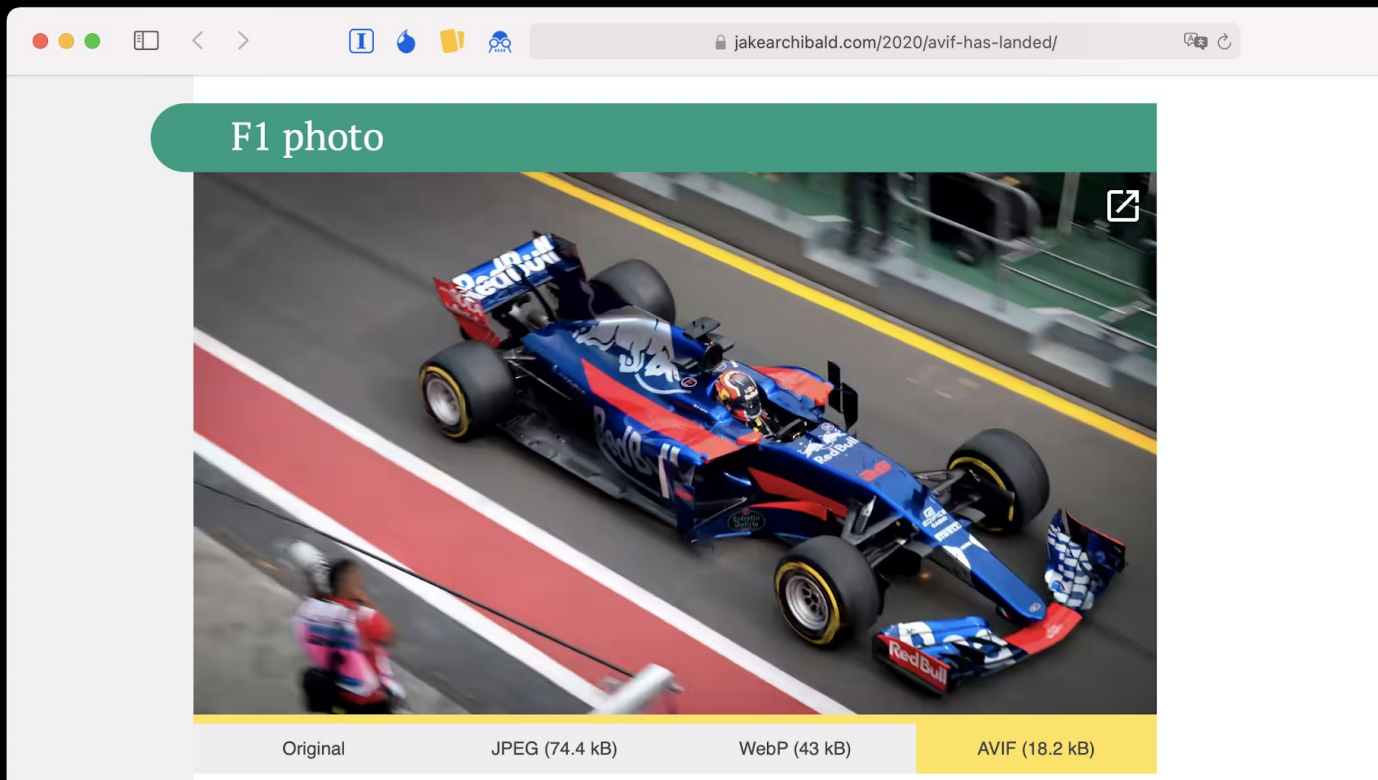
 [bit.ly/  
holy-perf-links](https://bit.ly/holy-perf-links)



# AVIF

Late hero  
image

 [bit.ly/  
holy-perf-links](https://bit.ly/holy-perf-links)





Late hero  
image

[bit.ly/  
holy-perf-links](https://bit.ly/holy-perf-links)

# Progressive JPEG



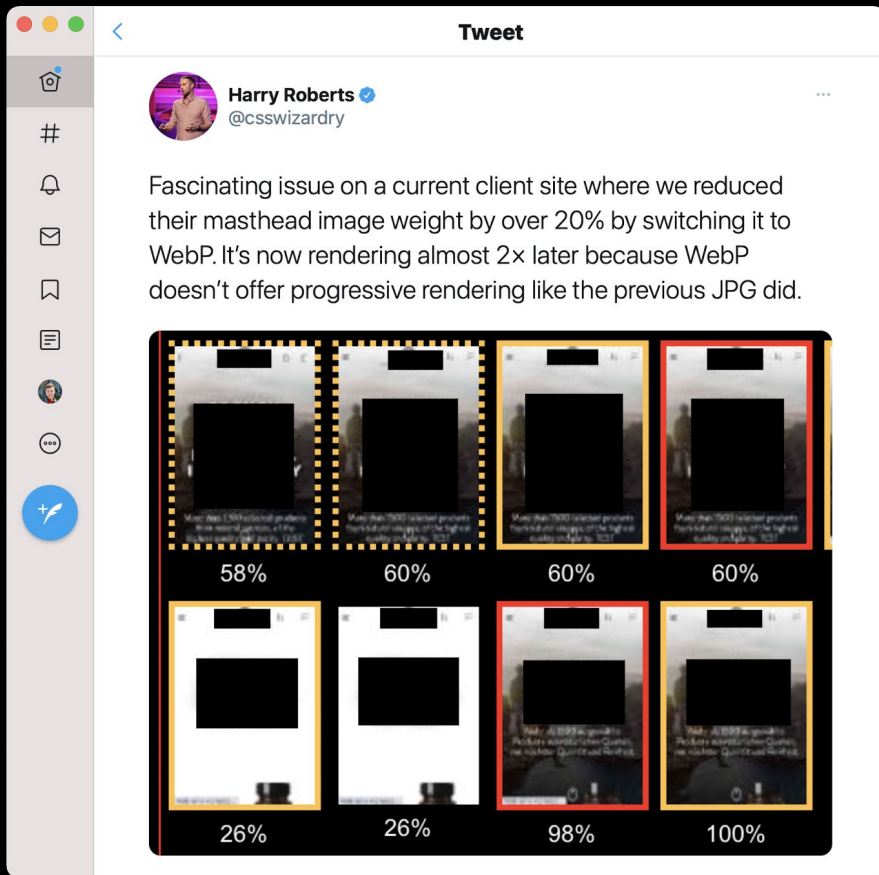
Non-progressive



Progressive

— GIFs by Jeff Atwood (codinghorror)





 [bit.ly/  
holy-perf-links](https://bit.ly/holy-perf-links)



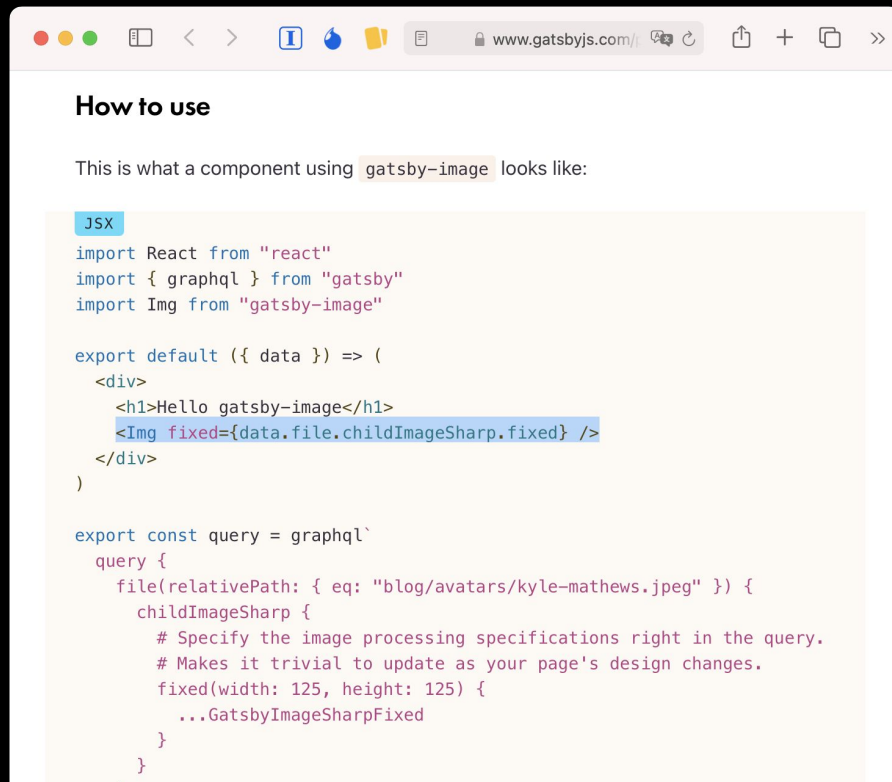
# No loading=lazy

Late hero  
image



Late hero  
image

# No loading=lazy





Late hero  
image

# No loading=lazy

```

```



Late hero  
image

# No loading=lazy

```

```

Or

```
<link rel="preload"  
      href="https://..."  
      as="image" />
```



Server  
response  
time



Render-  
blocking  
resources



Late hero  
image

***FID***

***TBT***





First-party  
code

script  
src

Third-party  
code

**Third-party code →**  
**half of the total**  
**JS cost**

video player interface showing a video of Harry Roberts speaking at a podium. The video title is "Harry Roberts | It's My (Third) Party and I'll Cry If I Want To | performance.now()". The video is from "More from Web Conferences Amsterdam". The video player includes a progress bar at 46:50, a play button, and a "New video" button. The video content shows a man in a red shirt and tan pants standing next to a podium with a laptop and a water bottle. The podium has a sign that says "performance.now()".

Harry Roberts | It's My (Third) Party and I'll Cry If I Want To | performance.now()

More from Web Conferences Amsterdam

Autoplay next video

bit.ly/  
holy-perf-links

Home

#

Notifications

Messages

Bookmarks


Lists

Profile

More

Create

Thread



**Ivan Akulov**  
@iamakulov

One of the reasons your Lighthouse score might be bad is third parties.  
  
Many (not all, though!) third parties execute a lot of JavaScript. This blocks the main thread & worsens your JS-related Lighthouse metrics (TTI/TBT).  
  
Here're several ways to optimize them – a thread 📄

02:21 · 06.10.20 · [Twitter Web App](#)

View Tweet activity

11 Retweets 42 Likes



**Ivan Akulov** @iamakulov · 06.10.20  
Replying to @iamakulov

1) Check if all third parties are needed

 [bit.ly/  
holy-perf-links](https://bit.ly/holy-perf-links)

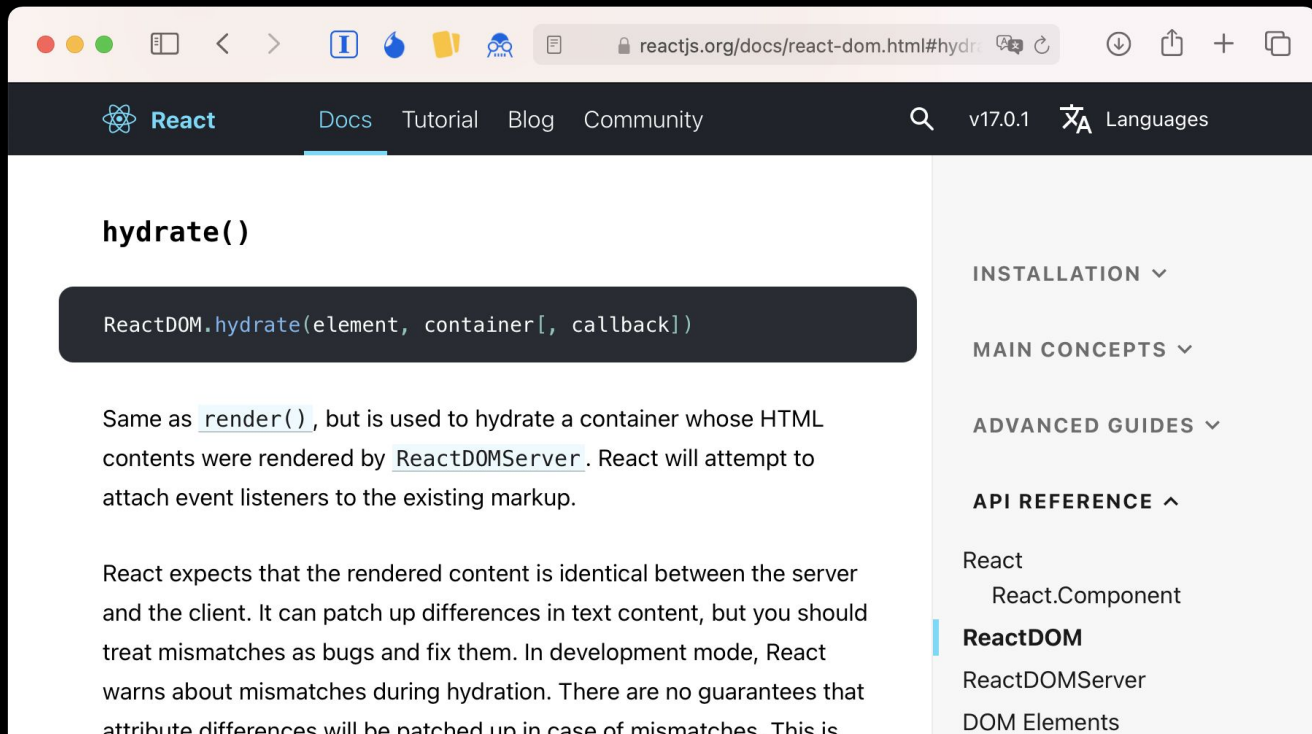


First-party  
code

script  
src

Third-party  
code

# Hydration is expensive



The image is a screenshot of a web browser displaying the React.js documentation page for the `hydrate()` method. The browser's address bar shows the URL `reactjs.org/docs/react-dom.html#hydrate`. The page header includes the React logo, navigation links for Docs, Tutorial, Blog, and Community, a search icon, the version number v17.0.1, and a Languages dropdown menu. The main content area features the title `hydrate()` followed by a code block containing `ReactDOM.hydrate(element, container[, callback])`. Below the code block, a paragraph explains that `hydrate()` is similar to `render()` but is used to hydrate a container with pre-rendered HTML from the server. It notes that React will attempt to attach event listeners to the existing markup and that mismatches between server and client content should be treated as bugs. A right-hand sidebar contains a table of contents with links to INSTALLATION, MAIN CONCEPTS, ADVANCED GUIDES, and API REFERENCE. Under API REFERENCE, a list includes React, React.Component, ReactDOM (which is highlighted with a blue bar), ReactDOMServer, and DOM Elements.

**hydrate()**

```
ReactDOM.hydrate(element, container[, callback])
```

Same as `render()`, but is used to hydrate a container whose HTML contents were rendered by `ReactDOMServer`. React will attempt to attach event listeners to the existing markup.

React expects that the rendered content is identical between the server and the client. It can patch up differences in text content, but you should treat mismatches as bugs and fix them. In development mode, React warns about mismatches during hydration. There are no guarantees that attribute differences will be patched up in case of mismatches. This is

**INSTALLATION** ▾

**MAIN CONCEPTS** ▾

**ADVANCED GUIDES** ▾

**API REFERENCE** ▲

- React
  - React.Component
  - ReactDOM**
  - ReactDOMServer
  - DOM Elements



First-party  
code

# Don't load React

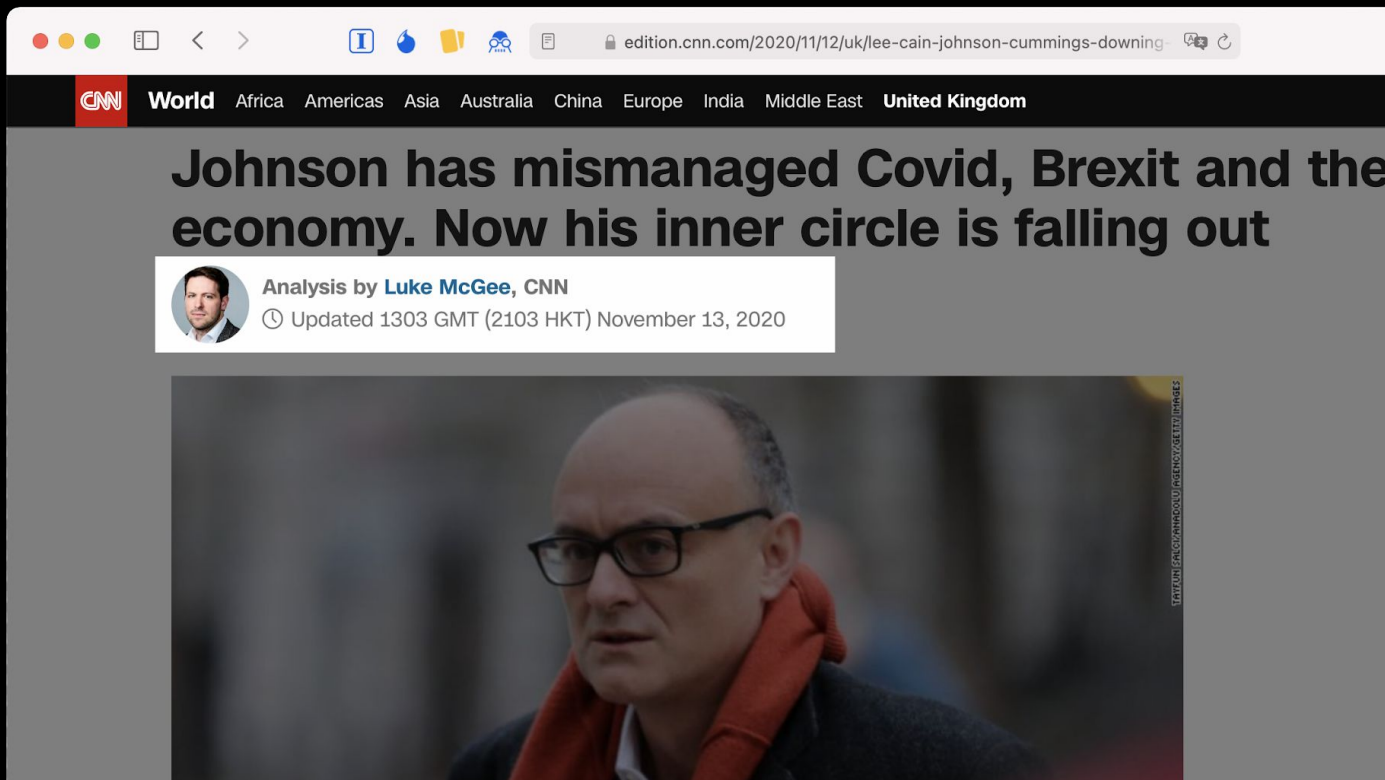
- ReactDOMServer.  
renderToStaticMarkup()
- gatsby-plugin-no-javascript
- gatsby-plugin-no-javascript-utils

 [bit.ly/  
holy-perf-links](https://bit.ly/holy-perf-links)



First-party  
code

# Partial hydration







First-party  
code

# Partial hydration

- @midudev/  
react-progressive-hydration
- @midudev/react-static-content

 bit.ly/  
holy-perf-links



First-party  
code

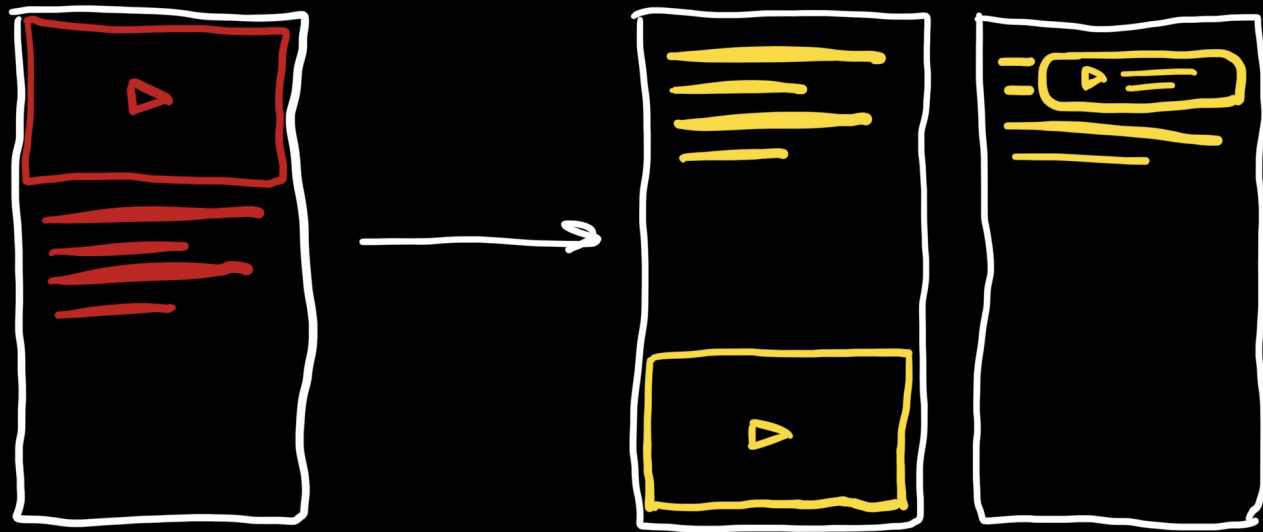
script  
src

Third-party  
code

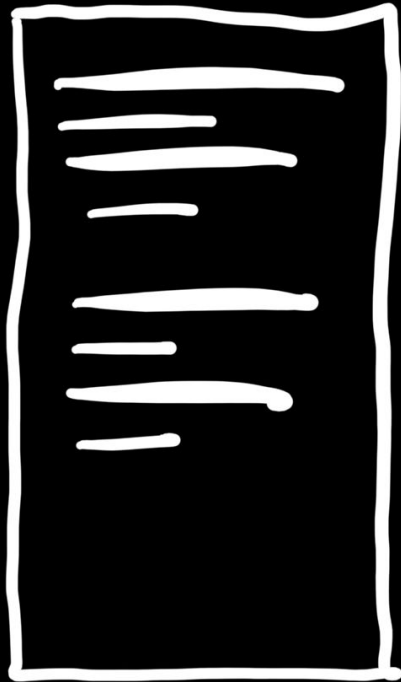
***CLS***

# Ad/video on top

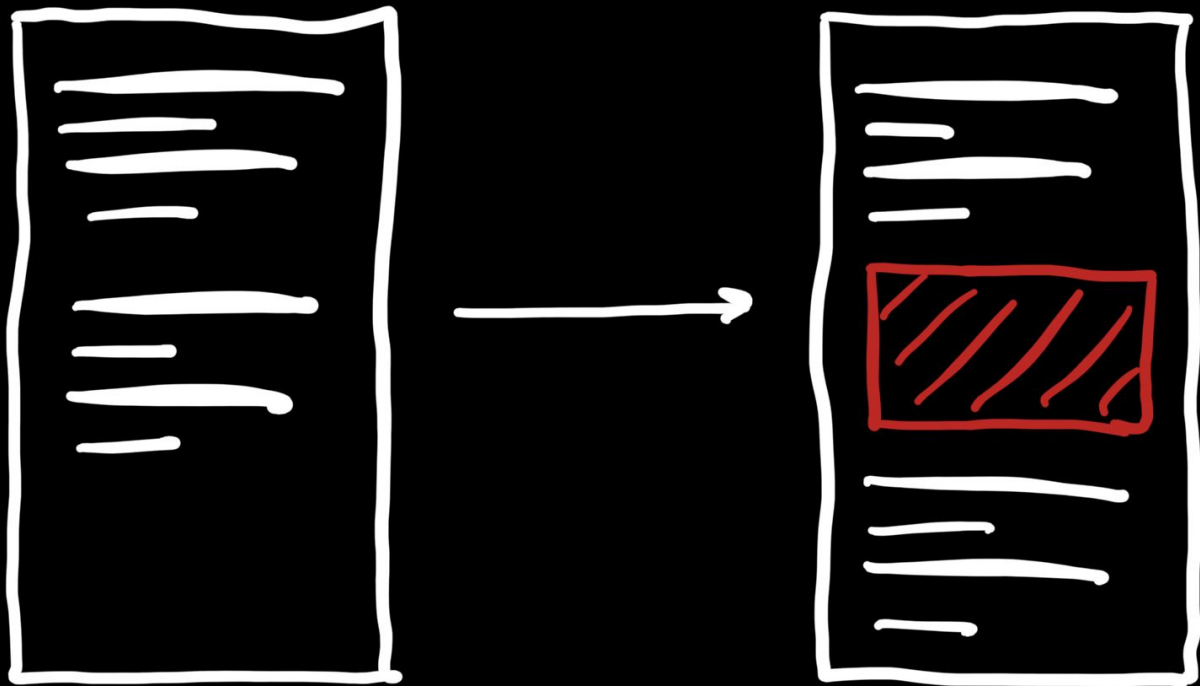
Talk to your designer



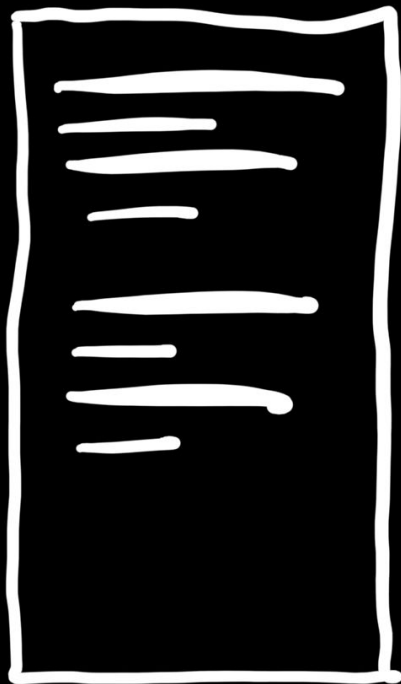
# Image dimensions



# Image dimensions



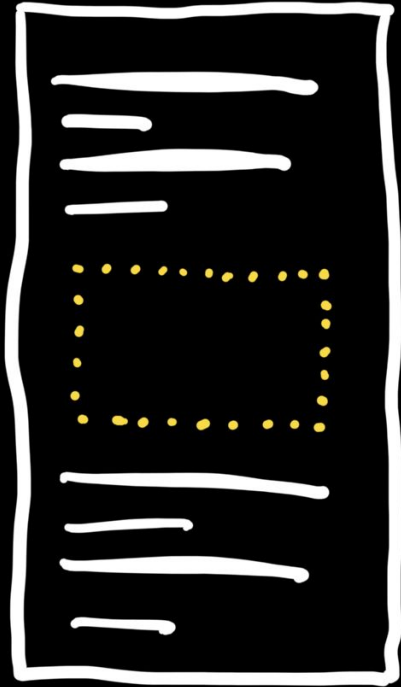
# Before



```
<img width="600"  
      height="400" />
```

```
img {  
  width: 100%;  
  height: auto;  
}
```

# Now

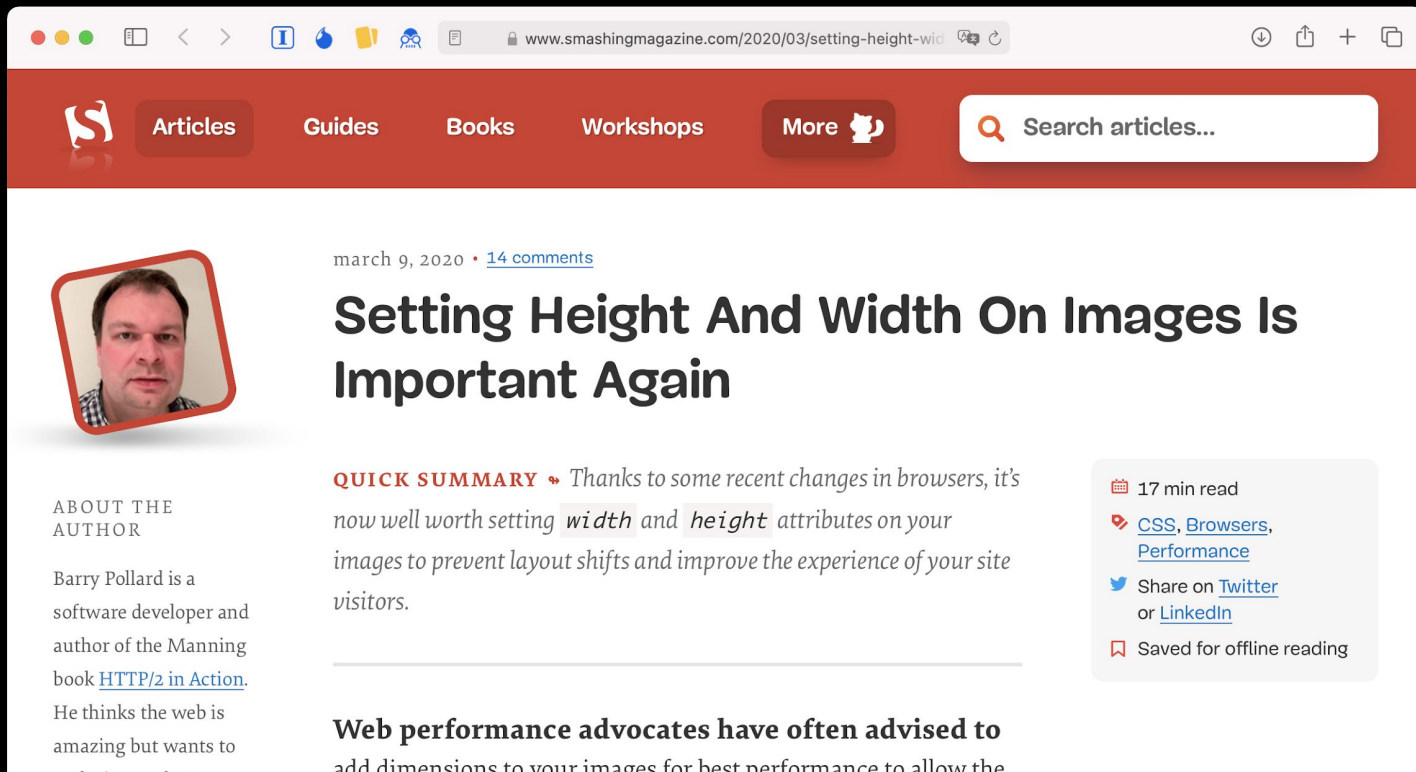


```
<img width="600"  
      height="400" />
```

```
img {  
  width: 100%;  
  height: auto;  
}
```



# Image dimensions



The screenshot shows a web browser window with the URL [www.smashingmagazine.com/2020/03/setting-height-width/](http://www.smashingmagazine.com/2020/03/setting-height-width/). The page features a red navigation bar with the Smashing Magazine logo and links to Articles, Guides, Books, Workshops, and More. A search bar is also present. The main content area displays an article titled "Setting Height And Width On Images Is Important Again" by Barry Pollard, dated March 9, 2020, with 14 comments. The article includes a "QUICK SUMMARY" and a "Web performance advocates have often advised to" section. A sidebar on the right offers a 17-minute read time, links to CSS, Browsers, and Performance, and options to share on Twitter or LinkedIn, or save for offline reading.

Articles Guides Books Workshops More

Search articles...

March 9, 2020 • 14 comments

## Setting Height And Width On Images Is Important Again

**QUICK SUMMARY** ✨ Thanks to some recent changes in browsers, it's now well worth setting *width* and *height* attributes on your images to prevent layout shifts and improve the experience of your site visitors.

**Web performance advocates have often advised to**

add dimensions to your images for best performance to allow the

17 min read

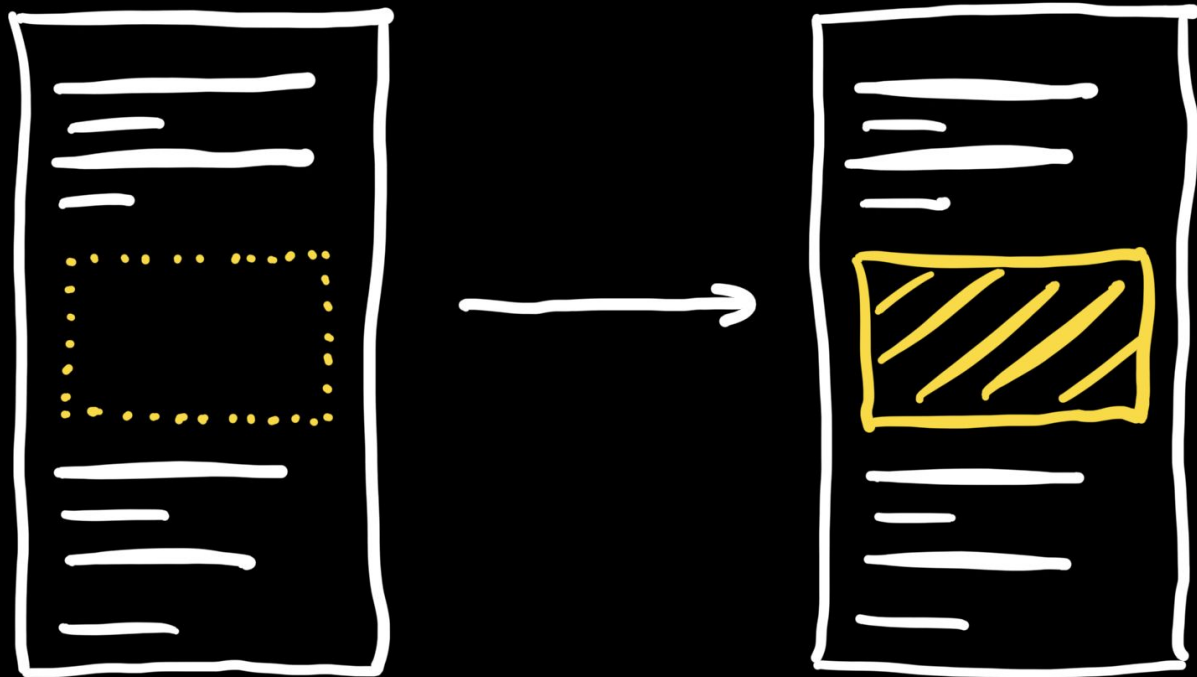
CSS, Browsers, Performance

Share on Twitter or LinkedIn

Saved for offline reading

bit.ly/holy-perf-links

# Image dimensions





Ad/video  
on top

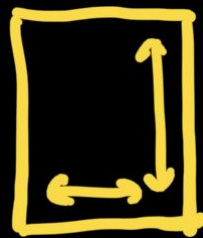


Image  
dimensions



[bit.ly/holy-perf-links](https://bit.ly/holy-perf-links)



# Ivan Akulov

GDE · Founder at 3perf.com  
Google · Framer · etc

# Thanks!

**Twitter:** @iamakulov

**Links:** [bit.ly/holy-perf-links](https://bit.ly/holy-perf-links)