

Website Performance

Thomas Puppe auf den JS Days Berlin 2023



Hi, ich bin Thomas



Senior Frontend Developer bei ZEIT Online

#a11y, #leanweb, #webperf



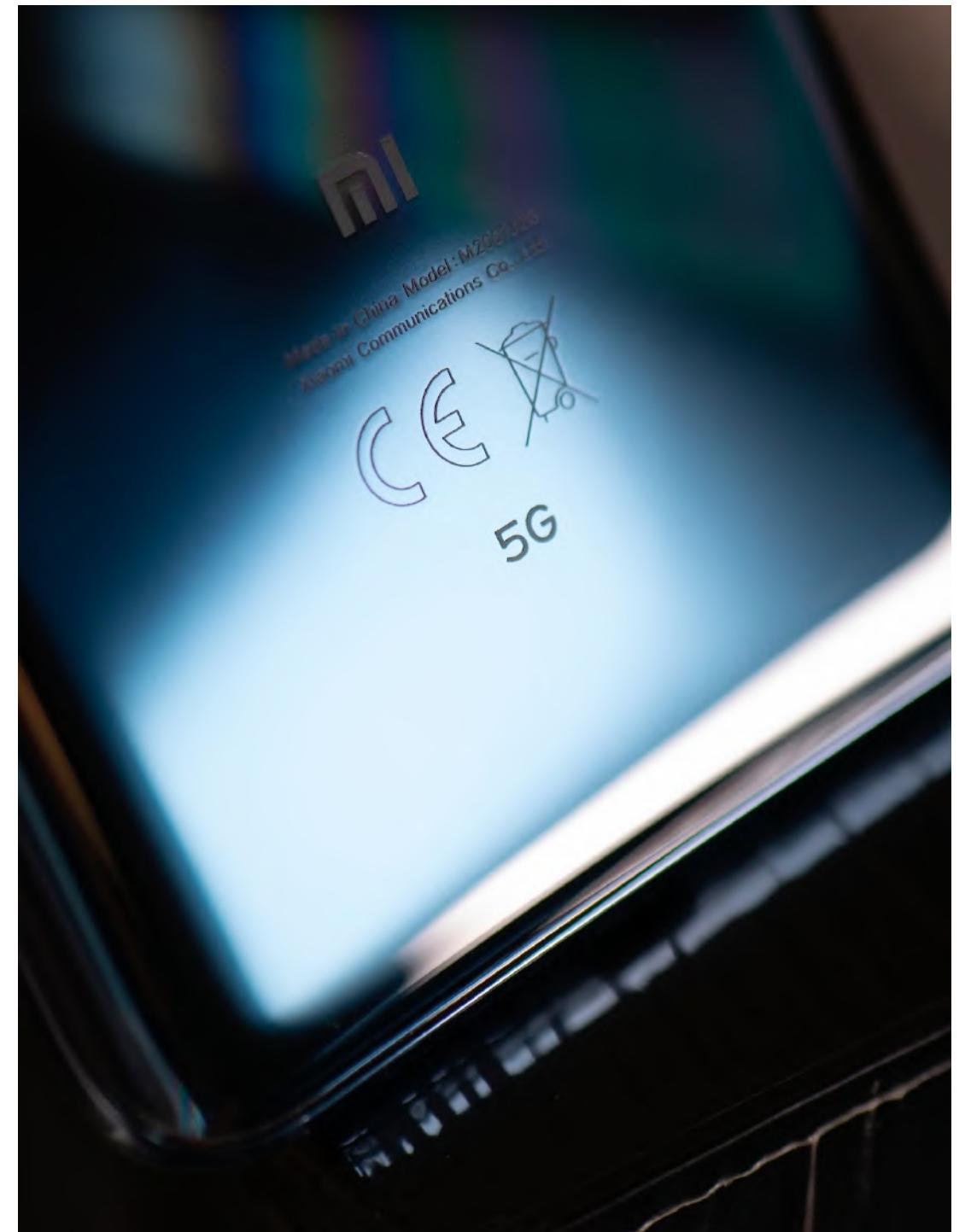
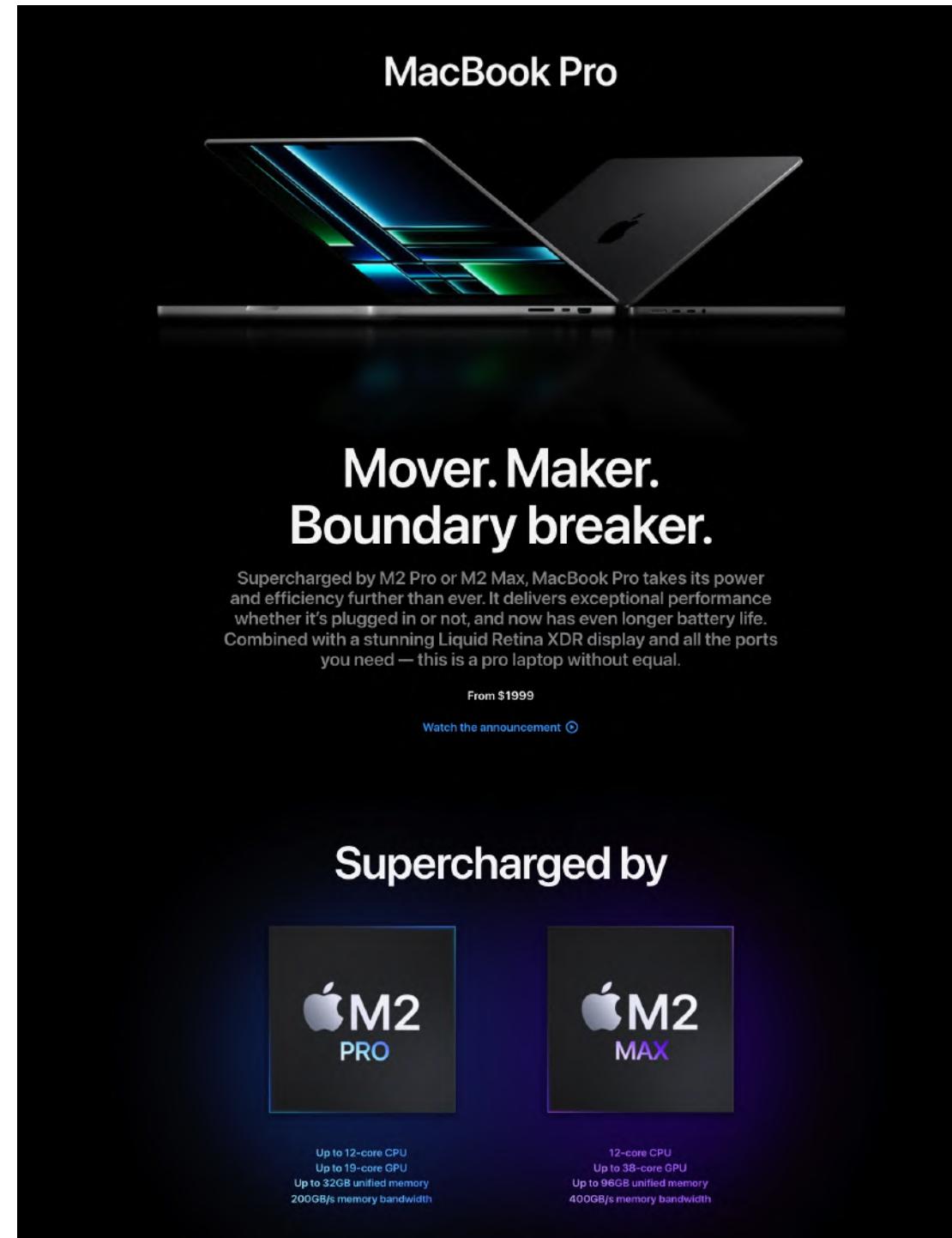


Hi, ich bin Thomas



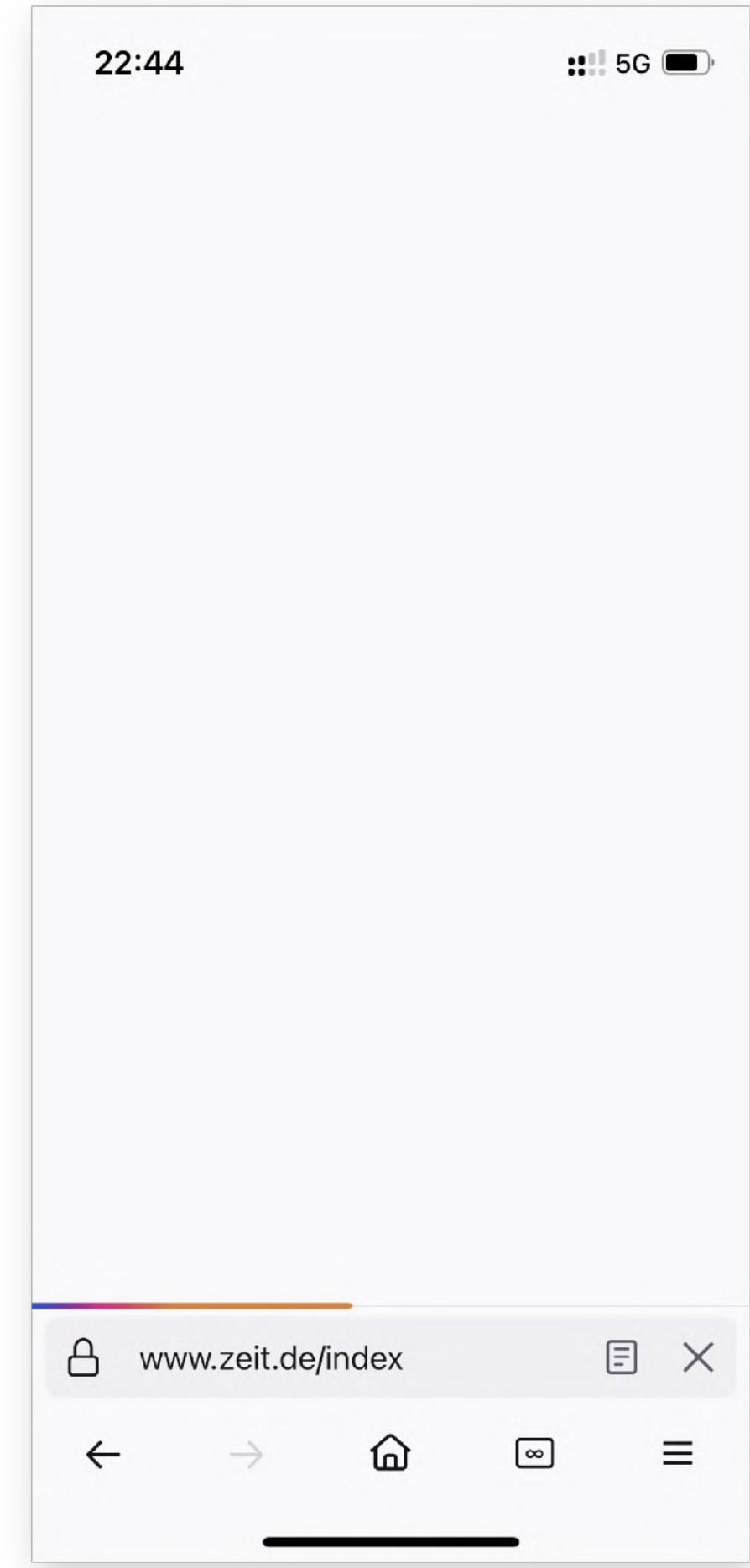
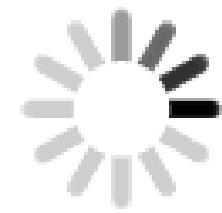
Senior Frontend Developer bei ZEIT Online

#a11y, #leanweb, #webperf



Credits: apple.com, [Lee Campbell auf Unsplash](https://unsplash.com/@leecampbell), [Shiwa ID auf Unsplash](https://unsplash.com/@shiwa_id)

www  wealthy western web

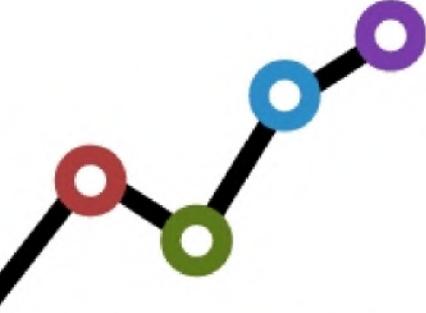




Website Performance ist ein Wettbewerbsvorteil!



WPO stats



Case studies and experiments demonstrating the impact of web performance optimization (WPO) on user experience and business metrics.

Performance studies related to “revenue”



Carpe improved Largest Contentful Paint by 52% and Cumulative Layout Shift by 41% and saw a 10% increase in traffic, a 5% increase in online store conversion rate, and a 15% increase in revenue.

[PERMALINK](#) [SHARE ON TWITTER](#)

#bounce rate #conversion rate #traffic #revenue #2023 #core web vitals



Rakuten 24 ran an A/B test showing improved vitals brought a 53.4% increase in revenue per visitor, 33.1% increase in conversion rate, 15.2% increase in average order value, 35.1% reduction in exit rate and more!

Filter by tag:

#2006 #2008 #2009

#2010 #2011 #2012

#2013 #2014 #2015

#2016 #2017 #2018

#2019 #2020 #2021

#2022 #2023

#abandonment #ads

#bounce rate #conversion

#conversion rate

#core web vitals



Website Performance



TTFB

**Download
Size**

**Asset
Count**

TTFB

Download
Size

Asset
Count

window
loaded

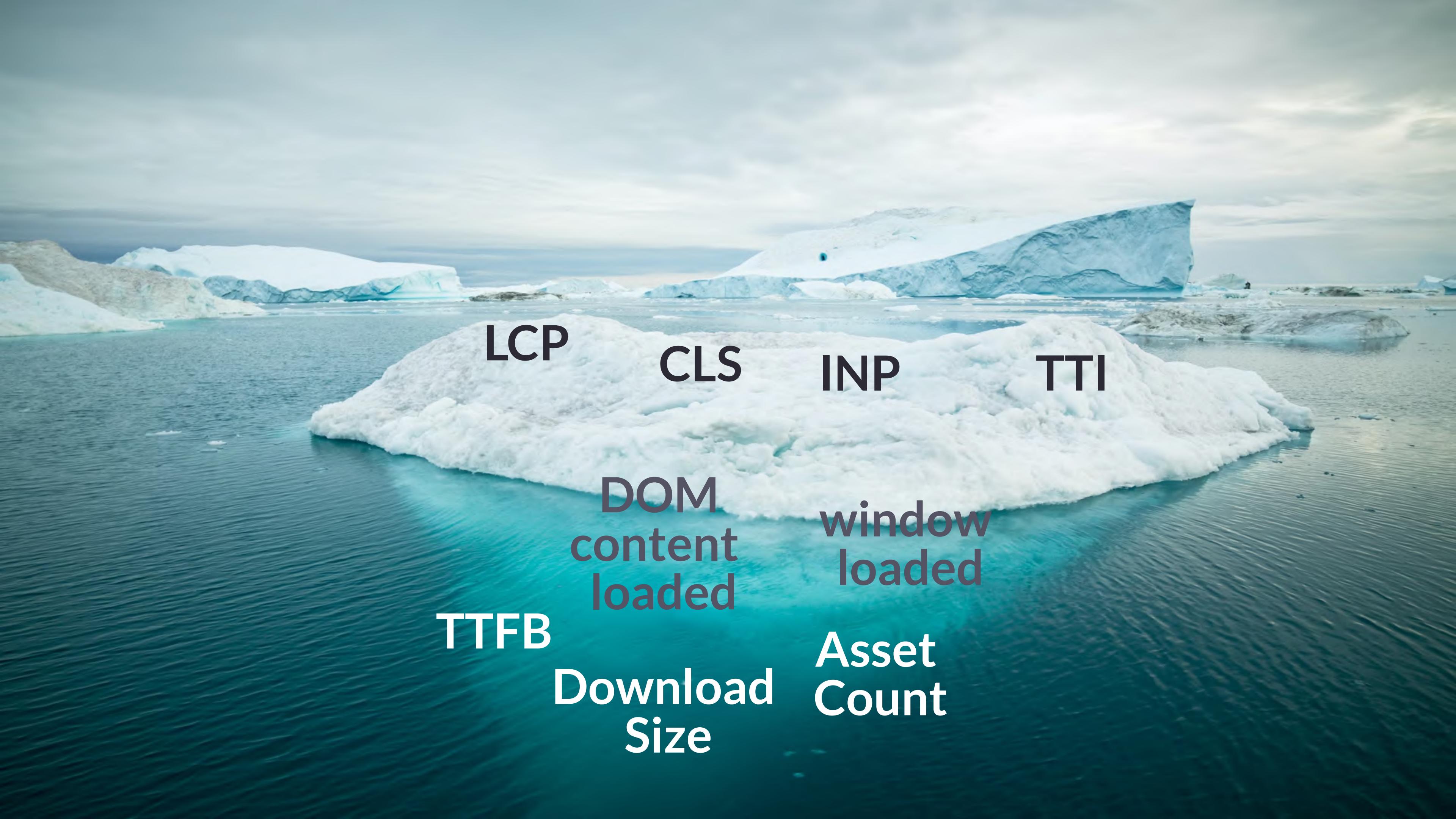
DOM
content
loaded

TTFB
Download
Size

Asset
Count

window
loaded
DOM
content
loaded

LCP
CLS
INP
TTI



LCP

CLS

INP

TTI

DOM
content
loaded

window
loaded

TTFB

Download
Size

Asset
Count

Aspekte von Website Performance

Aus Usersicht

schnell / schlank / ruckelt nicht

Browser / Technologien

HTML / CSS / Bilder / JavaScript / Schriften / Video / Audio

Build / Server

Bildformate / Komprimierung / CDN, Cloud / Caching / Netzwerk

Wirkung

Objektive Zahlen / Subjektive Wahrnehmung

Kontrolle

Messung / Testing / Monitoring / SEO Einfluss

Drei Säulen von Website Performance

A

R

O

Drei Säulen von Website Performance

A

AVOID

R

REDUCE

O

OPTIMIZE

Drei Säulen von Website Performance

A

AVOID

Benutzen wir alles?
Brauchen wir alles?

R

REDUCE

Cachen,
Komprimieren,
Minimieren.

O

OPTIMIZE

Ladeverhalten und
Priorisierung.

Drei Fünf Säulen von Website Performance

A R O M A

AVOID

Benutzen wir alles?

Brauchen wir alles?

REDUCE

Cachen,
Komprimieren,
Minimieren.

OPTIMIZE

Ladeverhalten und
Priorisierung

MEASURE

Tooling und
Monitoring

ATTITUDE

Performance
Culture

hands-on Workshop-Anteil



lama.thomaspuppe.de 

github.com/thomaspuppe/performance-workshop

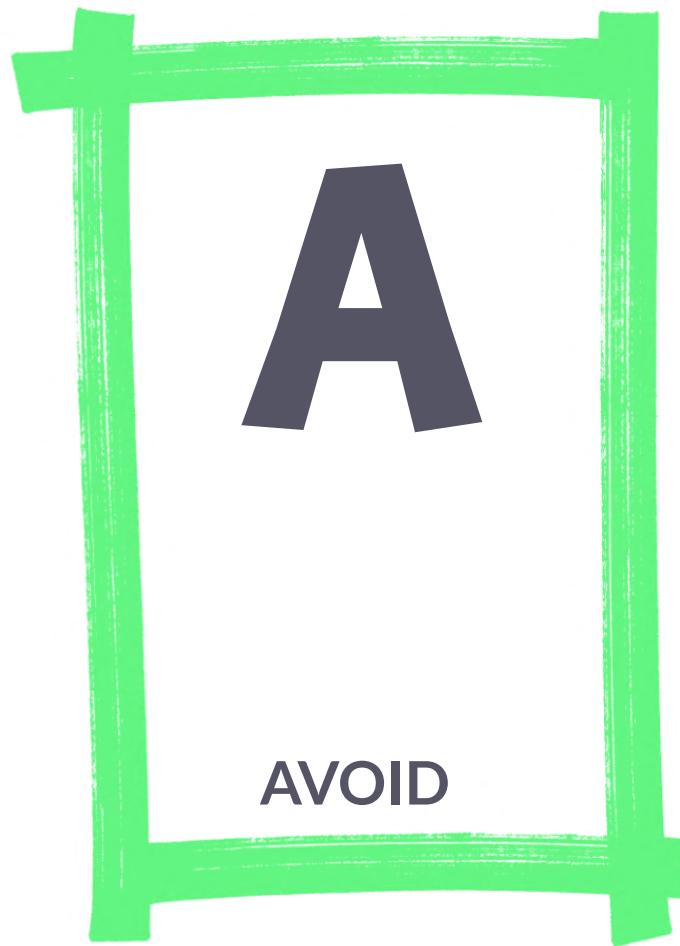


Dein Projekt 

yoursuperawesomepremiumwebsite.com

Credits: mage.space, [Ales Nesetril](#) auf [Unsplash](#)

Drei Fünf Säulen von Website Performance



AVOID

Benutzen wir alles?

Brauchen wir alles?

REDUCE

Cachen,
Komprimieren,
Minimieren.

OPTIMIZE

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Priorisierung

MEASURE

Tooling und
Monitoring

ATTITUDE

Performance
Culture

A person wearing a red flight suit with a yellow patch on the shoulder is shown from the chest up. They are covering their face with their hands, with their fingers spread. The background is a solid yellow color.

AVOID

Avoid Stuff:
ungenutzte
Sachen
finden

Browser DevTools

Elements Console Sources Network Lighthouse Performance Performance insights Memory Application Security > 7 45 1 ⚙️ X

Preserve log Disable cache No throttling Invert Hide data URLs Hide extension URLs All Doc JS Fetch/XHR CSS Font Img Media Manifest WS Wasm Other

ain:*.zeit.de larger-than:100 Blocked response cookies Blocked requests 3rd-party requests

Name	Status	Type	Initiator	Size	Time	Priority	Cache-Control	Waterfall
common.js idgpnmonknjnojddfkgkljpfnfcklj/js/tool	200 OK	script	common-4aa3a322.js:6 Script	142 kB	155 ms 135 ms	High High	no-cache	
theCard.js idgpnmonknjnojddfkgkljpfnfcklj/js/tool	200 OK	script	theCard-746d34e6.js:6 Script	762 kB	168 ms 134 ms	High High	no-cache	
gpt.js www.googletagservices.com/tag/js	200 OK	script	VM839:1 Script	101 kB	321 ms 91 ms	Low Low	private, max-age=900, sta...	
prebid8.16.0.js	200	script	VM842:1	131 kB	76 ms	Low		

9 / 387 requests | 3.1 MB / 8.1 MB transferred | 7.2 MB / 20.8 MB resources | Finish: 2.2 min | DOMContentLoaded: 1.78 s | Load: 5.02 s

Browser Developer Tools Network Tab

Filter: domain, larger-than, status-code, priority, ...
<https://developer.chrome.com/docs/devtools/network/reference/>

Avoid Stuff:
ungenutzte
Sachen
finden

Browser DevTools
Request Maps

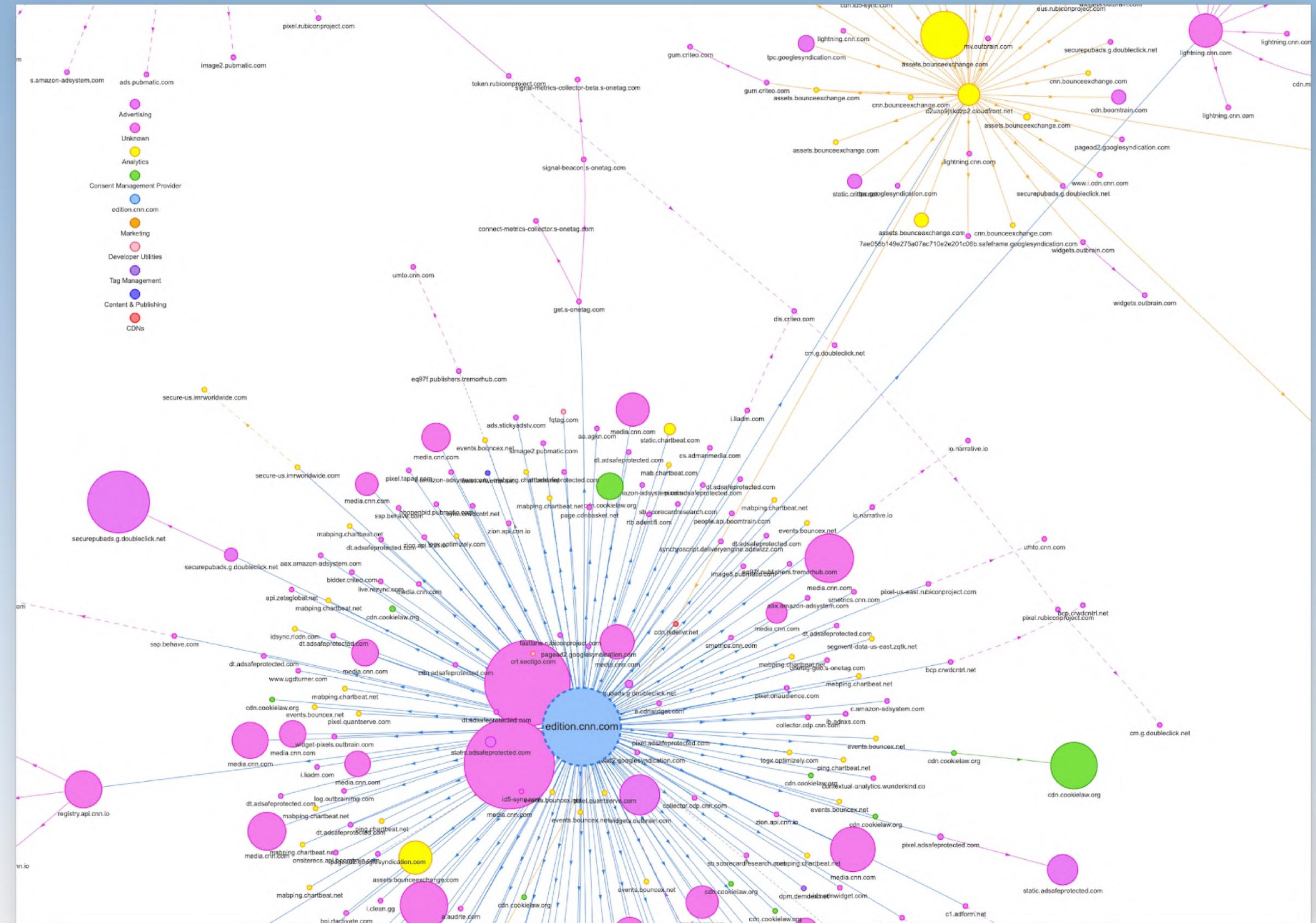
Avoid

Request Maps

- requestmap.webperf.tools
- requestmap.pages.dev

Gute Visualisierung, wenn die Request-Liste in den DevTools nicht ausreicht.

Oder um Stakeholder zu beeindrucken!



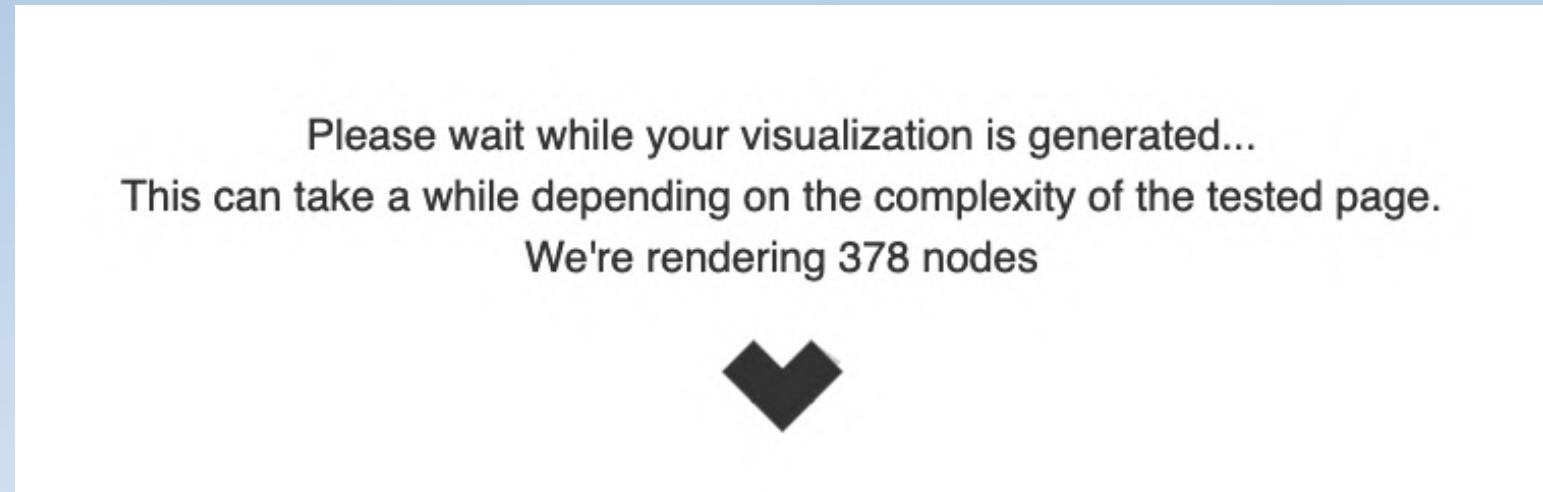
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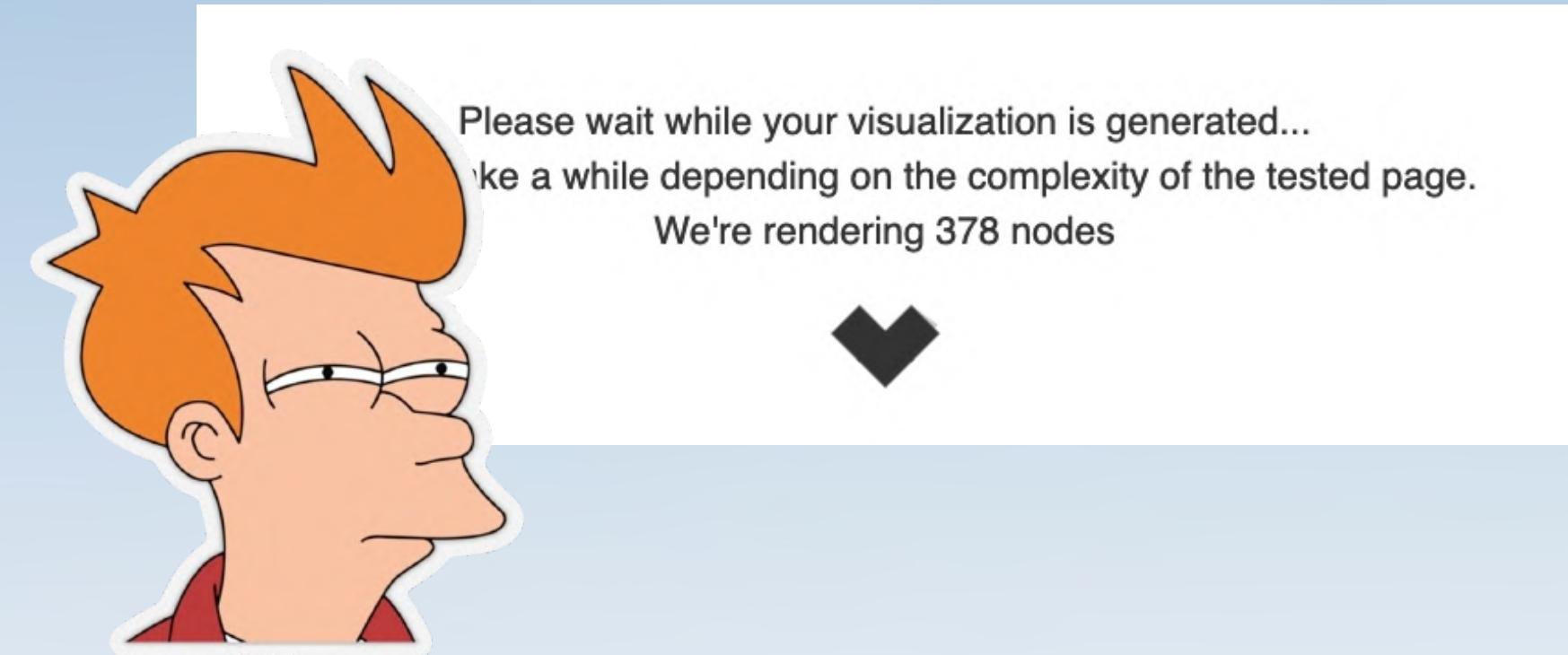
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Oder um Stakeholder zu beeindrucken!



Avoid Stuff: ungenutzte Sachen finden

Browser DevTools

Request Maps

Google Tag Manager ausmisten

Avoid Stuff: ungenutzte Sachen finden

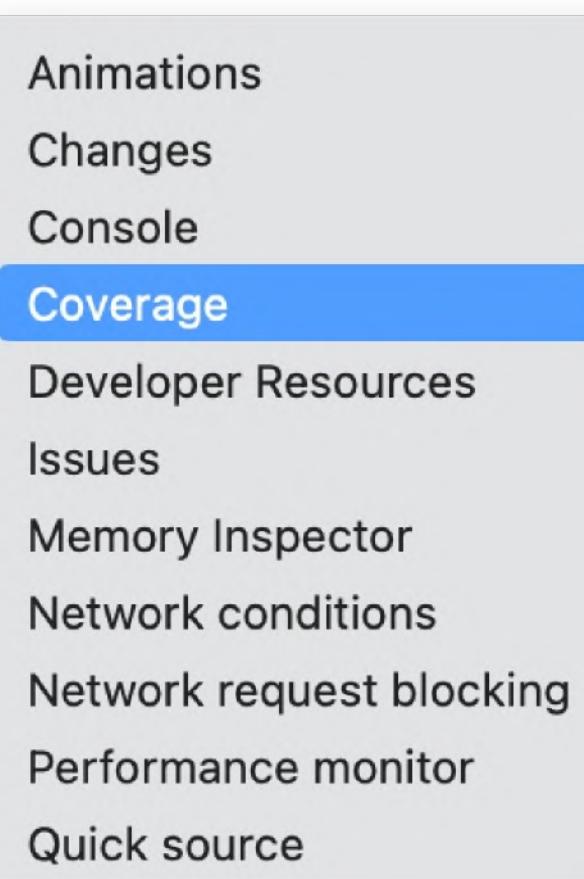
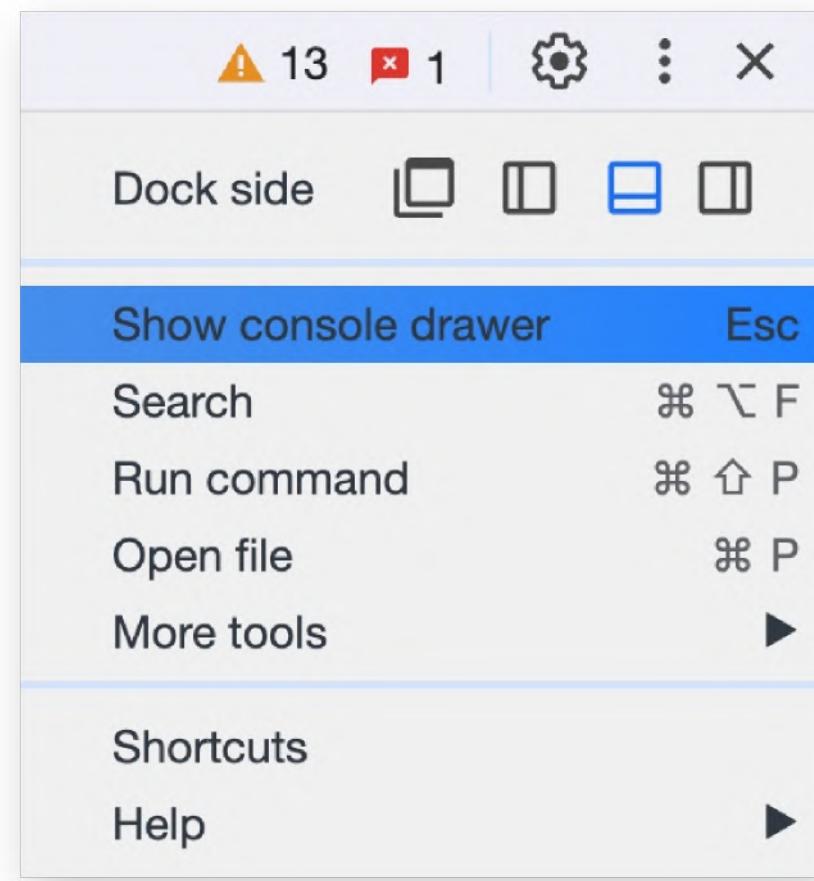
Browser DevTools

Request Maps

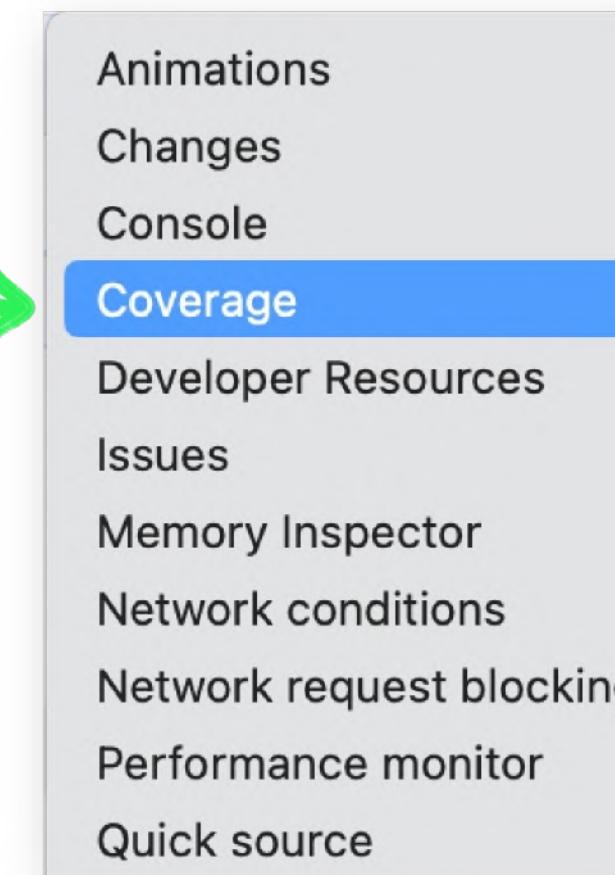
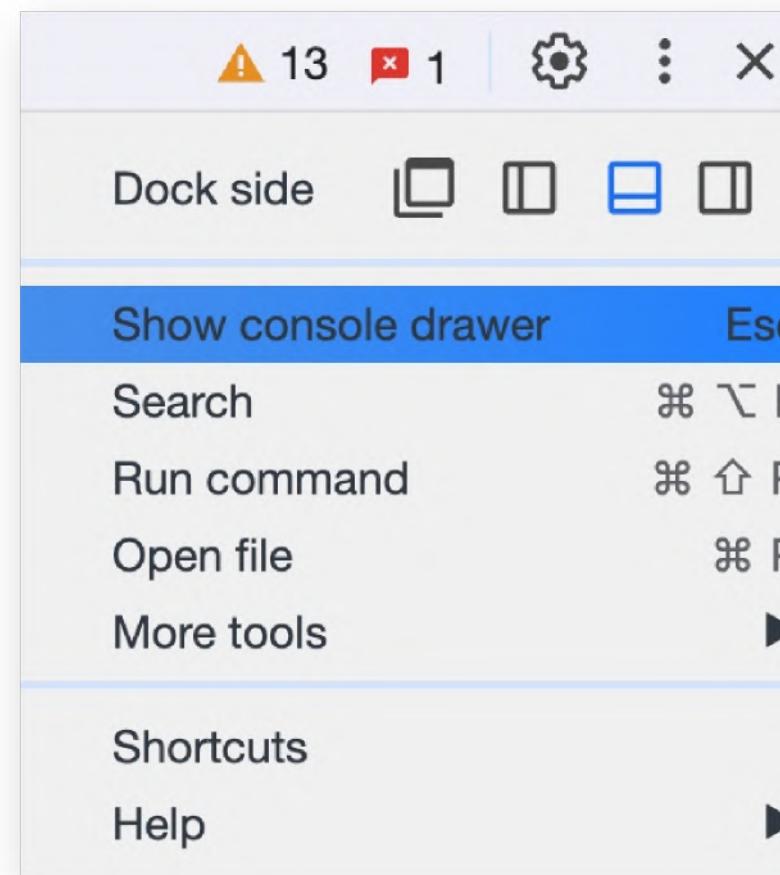
Google Tag Manager ausmisten

Unused CSS/JS via DevTools

Unused CSS/JS



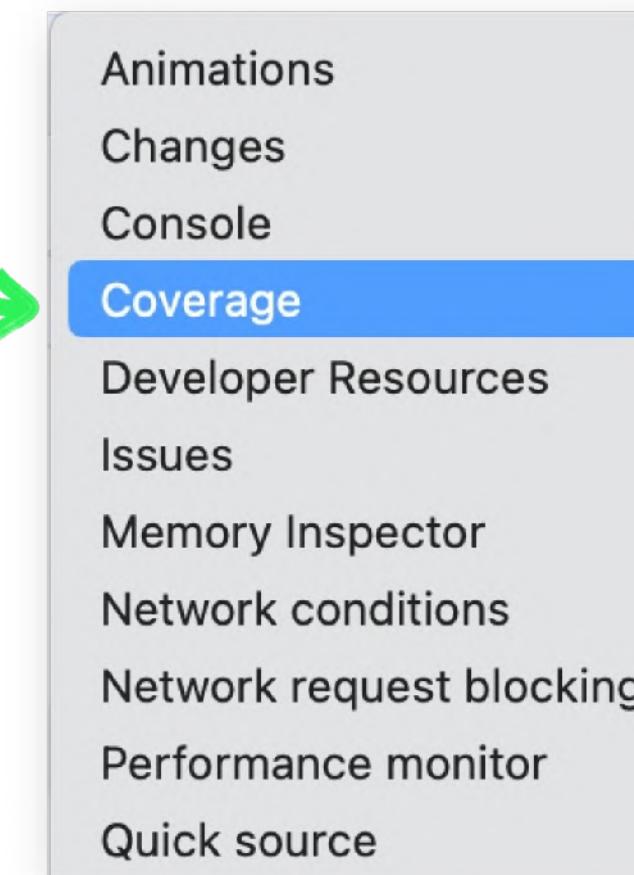
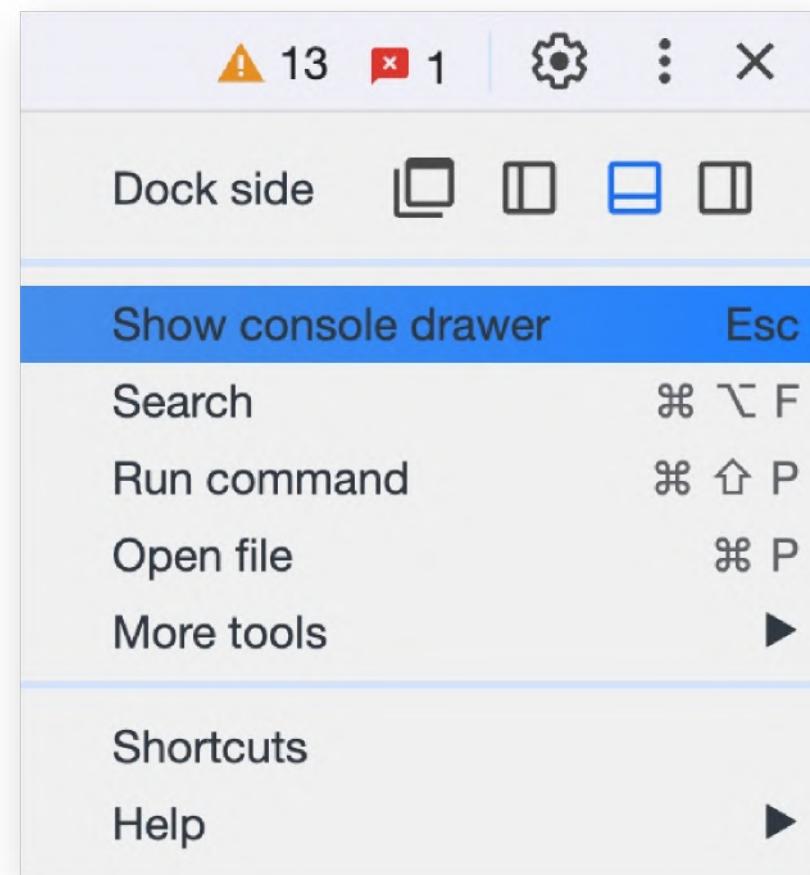
Unused CSS/JS



Unused CSS/JS

A table titled 'Unused CSS/JS' is displayed. It lists various URLs, their types, total bytes, unused bytes, and a usage visualization bar. The visualization bar consists of two colors: red (unused) and green (used). The table is sorted by 'Unused Bytes' in descending order.

URL	Type	Total Bytes	Unused Bytes	Usage Visualization
https://consent-cdn.zeit.de/wrapperMessagingWithoutDetection.js	JS (per function)	204 217	95 490 46.8%	
https://interactive.zeit.de/wiegehtesi.../app.c0381a78a97b00cf65db.cached.js	JS (per function)	156 095	75 866 48.6%	
https://interactive.zeit.de/g/2022/energiekostenmonitor/.../index.75ca3a4e.css	CSS	99 104	72 859 73.5%	
https://interactive.zeit.de/g/2022/energiekostenmonitor/.../react.8d1c6deb.mjs	JS (per function)	142 733	67 107 47%	
https://static.zeit.de/p/.../centerpage.92c7290fe3f64752971581ffeb39d5b6.css	CSS	97 335	62 054 63.8%	
https://static.zeit.de/p/zeit.... /base.4ac770b16c740c03c50e84fb93f1dd9.css	CSS	49 036	38 825 79.2%	
https://static.zeit.de/static/js/webtrekk/webtrekk_v4.5.3.min-3.js	JS (per function)	75 896	30 541 40.2%	
https://static.zeit.de/iqd/cdn_zeit_async/live/iqadcontroller.js	JS (per function)	302 396	22 570 7.5%	
https://www.zeit.de/index	CSS+JS (per function)	91 860	20 860 22.7%	
https://pixel.adsafeprotected.com/rjss/st/1684785/75510779/skeleton....../index	JS (per function)	47 397	16 785 35.4%	
https://static.zeit.de/p/... /navigation.3f1caf0352cf4094c00c33fee12e352c.css	CSS	23 123	16 505 71.4%	
https://wally.zeit.de/assets/footerbar-296671a5.css	CSS	16 158	16 158 100%	



```
1 .teaser-small-minor_label,.teaser-small_label {  
- color: var(--z-color-60--beyond);  
- display: block;  
- font-family: "TabletGothic","Helvetica Neue",He  
- font-size: .5625em;  
- letter-spacing: .15em;  
- line-height: 1;  
- margin-bottom: .625rem;  
- text-align: right;  
- text-transform: uppercase  
}  
  
.zon-teaser-poster_commentcount,.zon-teaser-news_  
cursor: pointer;  
transition-property: border-color,color,opacity;  
transition-duration: .2s;  
color: inherit;  
position: relative;  
white-space: nowrap;  
z-index: 2
```

Unused CSS/JS

URL	Type	Total Bytes	Unused Bytes	Usage Visualization
https://consent-cdn.zeit.de/wrapperMessagingWithoutDetection.js	JS (per function)	204 217	95 490 46.8%	
https://interactive.zeit.de/wiegehtesi.../app.c0381a78a97b00cf65db.cached.js	JS (per function)	156 095	75 866 48.6%	
https://interactive.zeit.de/g/2022/energiestrommonitor/.../index.75ca3a4e.css	CSS	99 104	72 859 73.5%	
https://interactive.zeit.de/g/2022/energiestrommonitor/.../react.8d1c6deb.mjs	JS (per function)	142 733	67 107 47%	
https://static.zeit.de/p/.../centerpage.92c7290fe3f64752971581ffeb39d5b6.css	CSS	97 335	62 054 63.8%	
https://static.zeit.de/p/zeit.... /base.4ac770b16c740c03c50e84fb93f1dd9.css	CSS	49 036	38 825 79.2%	
https://static.zeit.de/static/js/webtrekk/webtrekk_v4.5.3.min-3.js	JS (per function)	75 896	30 541 40.2%	
https://static.zeit.de/iqd/cdn_zeit_async/live/iqadcontroller.js	JS (per function)	302 396	22 570 7.5%	
https://www.zeit.de/index	CSS+JS (per function)	91 860	20 860 22.7%	
https://pixel.adsafeprotected.com/rjss/st/1684785/75510779/skeleton....../index	JS (per function)	47 397	16 785 35.4%	
https://static.zeit.de/p/... /navigation.3f1caf0352cf4094c00c33fee12e352c.css	CSS	23 123	16 505 71.4%	
https://wally.zeit.de/assets/footerbar-296671a5.css	CSS	16 158	16 158 100%	



Avoid Code: System Features nutzen

Avoid Code:
System
Features
nutzen

System Fonts

Avoid Code

System Fonts nutzen

Vielleicht kannst du auf Webfonts verzichten. Die System-Schriften auf den Betriebssystemen sind vielfältig.

- <https://modernfontstacks.com/>
- <https://gist.github.com/don1138/5761014>
- <https://meowni.ca/font-style-matcher/>

System UI	Transitional	Old Style	Humanist	Geometric Humanist
ABCDEGHIJKLM NOPQRSTUVWXYZ abcdefghijklm nopqrstuvwxyz 1234567890 100 200 300 400 500 600 700 800 900 font-family: <u>system-ui</u> , sans-serif;	ABCDEGHIJKLM NOPQRSTUVWXYZ abcdefghijklm nopqrstuvwxyz 1234567890 100 200 300 400 500 600 700 800 900 font-family: <u>Charter</u> , "Bitstream Charter", "Sitka Text", <u>Cambria</u> , serif;	ABCDEGHIJKLM NOPQRSTUVWXYZ abcdefghijklm nopqrstuvwxyz 1234567890 100 200 300 400 500 600 700 800 900 font-family: "Iowan Old Style", "Palatino Linotype", "URW Palladio L", P052, serif;	ABCDEGHIJKLM NOPQRSTUVWXYZ abcdefghijklm nopqrstuvwxyz 1234567890 100 200 300 400 500 600 700 800 900 font-family: <u>Seravek</u> , "Gill Sans Nova", Ubuntu, <u>Calibri</u> , "DejaVu Sans", source-sans-pro, sans-serif;	ABCDEGHIJKLM NOPQRSTUVWXYZ abcdefghijklm nopqrstuvwxyz 1234567890 100 200 300 400 500 600 700 800 900 font-family: <u>Avenir</u> , Montserrat, Corbel, "URW Gothic", source-sans-pro, sans-serif;
Classical Humanist	Neo-Grotesque	Monospace Slab Serif	Monospace Code	Industrial Display
ABCDEGHIJKLM NOPQRSTUVWXYZ abcdefghijklm nopqrstuvwxyz 1234567890 100 200 300 400 500 600 700 800 900 font-family: <u>Optima</u> , Candara, "Noto Sans", source-sans-pro, sans-serif;	ABCDEGHIJKLM NOPQRSTUVWXYZ abcdefghijklm nopqrstuvwxyz 1234567890 100 200 300 400 500 600 700 800 900 font-family: <u>Inter</u> , Roboto, "Helvetica Neue", "Arial Nova", "Nimbus Sans", Arial, sans-serif;	ABCDEGHIJKLM NOPQRSTUVWXYZ abcdefghijklm nopqrstuvwxyz 1234567890 100 200 300 400 500 600 700 800 900 font-family: "Nimbus Mono PS", "Courier New", monospace;	ABCDEGHIJKLM NOPQRSTUVWXYZ abcdefghijklm nopqrstuvwxyz 1234567890 100 200 300 400 500 600 700 800 900 font-family: ui-monospace, "Cascadia Code", "Source Code Pro", Menlo, Consolas, "DejaVu Sans Mono", monospace;	ABCDEGHIJKLM NOPQRSTUVWXYZ abcdefghijklm nopqrstuvwxyz 1234567890 100 200 300 400 500 600 700 800 900 font-family: <u>Bahnschrift</u> , "DIN Alternate", "Franklin Gothic Medium", "Nimbus Sans Narrow", sans-serif-condensed, sans-serif;
Rounded Sans Display	Slab Serif Display	Antique	Didone Display	Handwritten Display
ABCDEGHIJKLM NOPQRSTUVWXYZ abcdefghijklm nopqrstuvwxyz 1234567890 100 200 300 400 500 600 700 800 900 font-family: ui-rounded, <u>Hiragino Maru Gothic ProN</u> , Quicksand, Comfortaa, Manjari, "Arial Rounded MT", "Arial Rounded MT Bold", Calibri, source-sans-pro, sans-serif;	ABCDEGHIJKLM NOPQRSTUVWXYZ abcdefghijklm nopqrstuvwxyz 1234567890 100 200 300 400 500 600 700 800 900 font-family: Rockwell, "Rockwell Nova", "Roboto Slab", "Calibri", serif;	ABCDEGHIJKLM NOPQRSTUVWXYZ abcdefghijklm nopqrstuvwxyz 1234567890 100 200 300 400 500 600 700 800 900 font-family: Superclarendon, "Bookman Old Style", "URW Bookman", "URW Bookman L", "Georgia Pro", Georgia, serif;	ABCDEGHIJKLM NOPQRSTUVWXYZ abcdefghijklm nopqrstuvwxyz 1234567890 100 200 300 400 500 600 700 800 900 font-family: Didot, "Bodoni MT", "Noto Serif Display", "URW Palladio L", P052, Sylfaen, serif;	ABCDEGHIJKLM NOPQRSTUVWXYZ abcdefghijklm nopqrstuvwxyz 1234567890 100 200 300 400 500 600 700 800 900 font-family: "Segoe Print", "Bradley Hand", Chilanka, TSCu_Comic, casual, cursive;

Avoid Code:
System
Features
nutzen

System Fonts
Dialog / Modal Feature

@material/dialog

14.0.0 • Public • Published a year ago

Readme

Code Beta

15 Dependencies

106 Dependents

1.672 Versions

Dialogs

Dialogs inform users about a task and can contain critical information, require decisions, or involve multiple tasks.

There are four types of dialogs:

1. Alert
2. Simple
3. Confirmation
4. Full-screen

Using dialogs

A dialog is a type of modal window that appears in front of app content to provide critical information or ask for a decision. Dialogs disable all app functionality when they appear, and remain on screen until confirmed, dismissed, or a required action has been taken.

Dialogs are purposefully interruptive, so they should be used sparingly.

For additional guidance, refer to the [Material guidelines](#).

Installation

```
npm install @material/dialog
```

Styles

```
@use "@material/dialog";  
  
@include dialog.core-styles;
```

Note: Styles for any components you intend to include within dialogs (e.g. List, Checkboxes, etc.) must also be imported.

JavaScript Instantiation

```
import {MDCDialog} from '@material/dialog';  
const dialog = new MDCDialog(document.querySelector('.mdc-dialog'));
```

Install

```
> npm i @material/dialog
```

Repository

github.com/material-components/mate...

Homepage

github.com/material-components/mate...

Weekly Downloads

625.809



Version

14.0.0

License

MIT

Unpacked Size

1.3 MB

Total Files

44

Issues

398

Pull Requests

91

Last publish

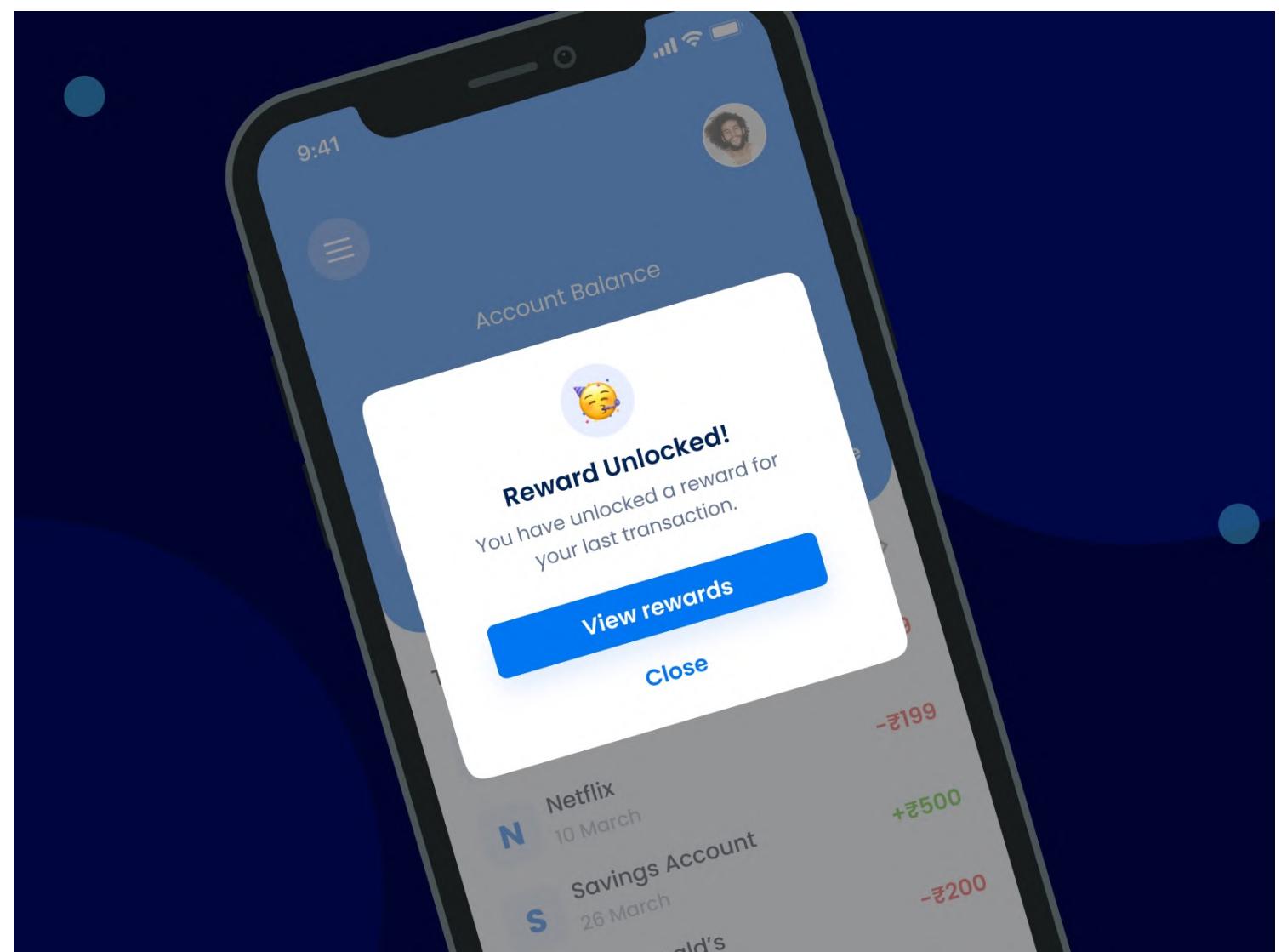
3 days ago

Collaborators



>-Try on RunKit

Report malware



Credits: Aishwarya Vijay Kumar auf Dribbble

15 Dependencies **106 Dependents** **1.672 Vers**

Install
nation, require decisions, or
nbsp; > npm i @material/dialog

Repository
[github.com/material-components/](#)

Homepage
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Weekly Downloads
625.809

Version
14.0.0 License
MIT

Unpacked Size
1.3 MB Total Files
44

Issues
398 Pull Requests
91

Last publish
3 days ago

Collaborators


dialogs (e.g. List, Checkboxes,
tor('.mdc-dialog'));

>-Try on RunKit

Report malware

```
dialog>
  <form method="dialog">
    <p>
      Content
    </p>
    <button>
      Close
    </button>
  </form>
</dialog>
```

```
dialog { ... }
dialog[open] { ... }
```

```
dialog::backdrop {
  background: red;
}
```

```
const dialog = document.querySelector('dialog');

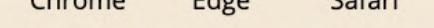
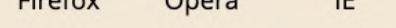
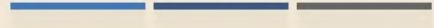
// Show the dialog as non modal
dialog.show();

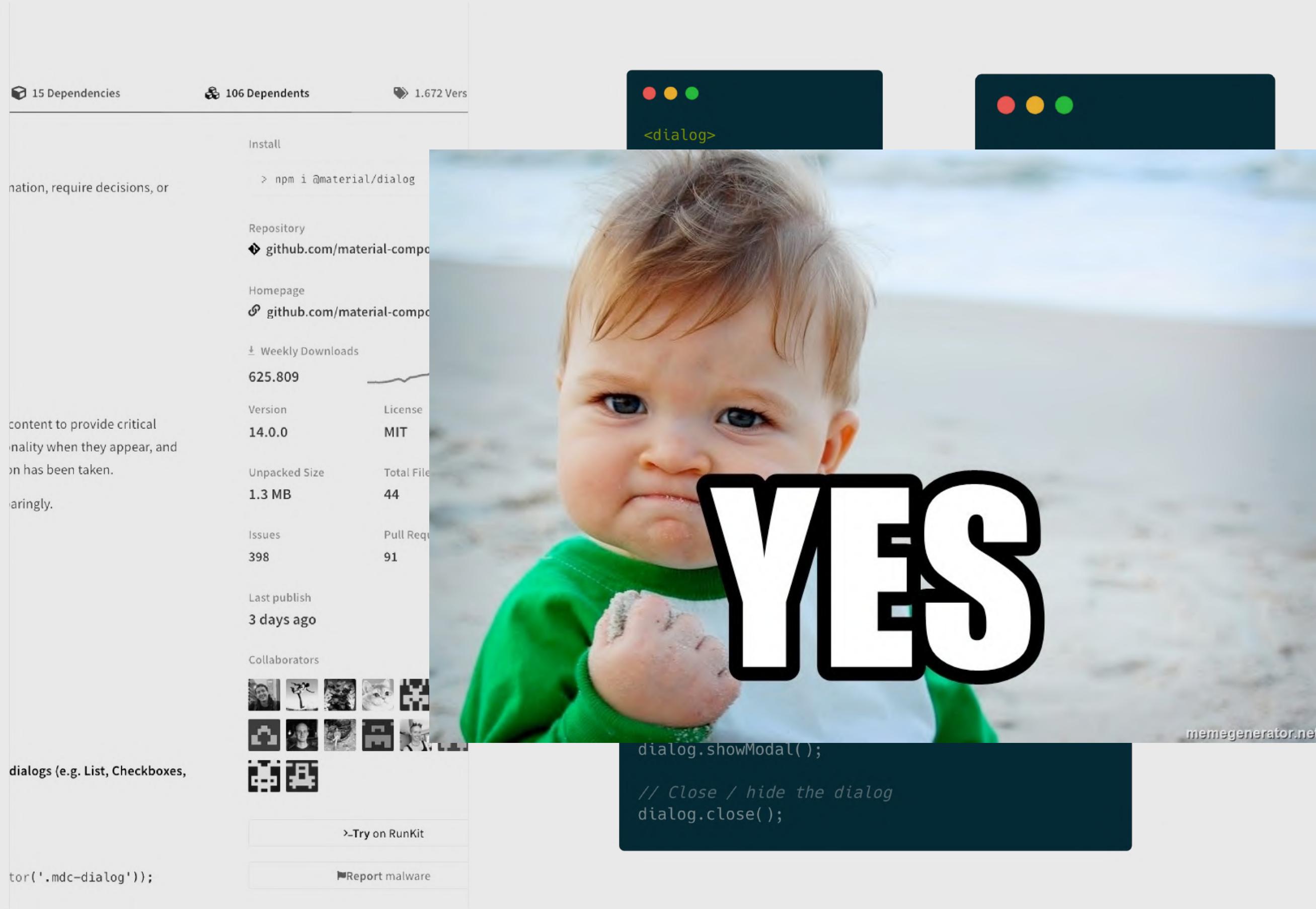
// Show dialog as modal
dialog.showModal();

// Close / hide the dialog
dialog.close();
```

Dialog element [- LS](#)

Method of easily creating custom dialog boxes to display to the user with modal or non-modal options. Also includes a ::backdrop pseudo-element for behind the element.

Current aligned	Usage relative	Date relative	Filtered	All	
Chrome	Edge *	Safari	Firefox	Opera	IE
					
2-52			1 53-79	10-18	
4-31			1 32-36	12-18	3.1-15.3
2 32-36	12-18	3.1-15.3	1 4 80-97	19-23	
37-116	79-116	15.4-16.5	98-116	24-101	6-10
117	117	16.6	117	102	11
118-120			17.0-TP	118-120	



Dialog element 📄 - LS

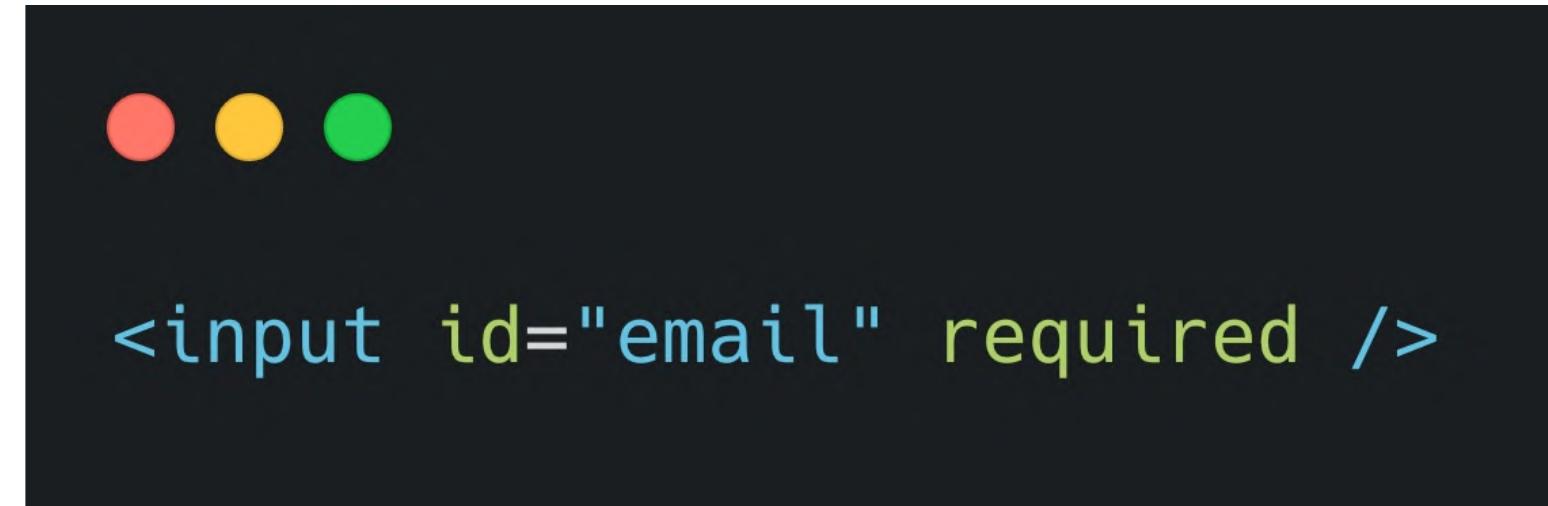
Method of easily creating custom dialog boxes to display to the user with modal or non-modal options. Also includes a ::backdrop pseudo-element for behind the element.

Current aligned	Usage relative	Date relative	Filtered	All	⚙️
Chrome	Edge *	Safari	Firefox	Opera	IE
4-31			2-52		
32-36	12-18	3.1-15.3	1 53-79	10-18	
37-116	79-116	15.4-16.5	1 80-97	19-23	
117	117	16.6	117	102	6-10
118-120			17.0-TP	118-120	

Avoid Code:
System
Features
nutzen

System Fonts
Dialog / Modal Feature
Formular Validierung

Formularvalidierung nativ



Formularvalidierung nativ



```
<input id="email" type="email" required />
```

Formularvalidierung nativ

```
● ● ●

<input id="email" required />

<style>
  input:invalid {
    border: 2px dashed red;
  }

  input:invalid:required {
    background-image: linear-gradient(to right, pink, lightgreen);
  }

  input:valid {
    border: 2px solid black;
  }
</style>
```

Formularvalidierung nativ

```
<input type="number" min="0" step="5" max="100">

<style>
  input:invalid:out-of-range:before {
    content: "This is not 'Nam, this is bowling. There are rules!"
  }
</style>
```

Formularvalidierung nativ

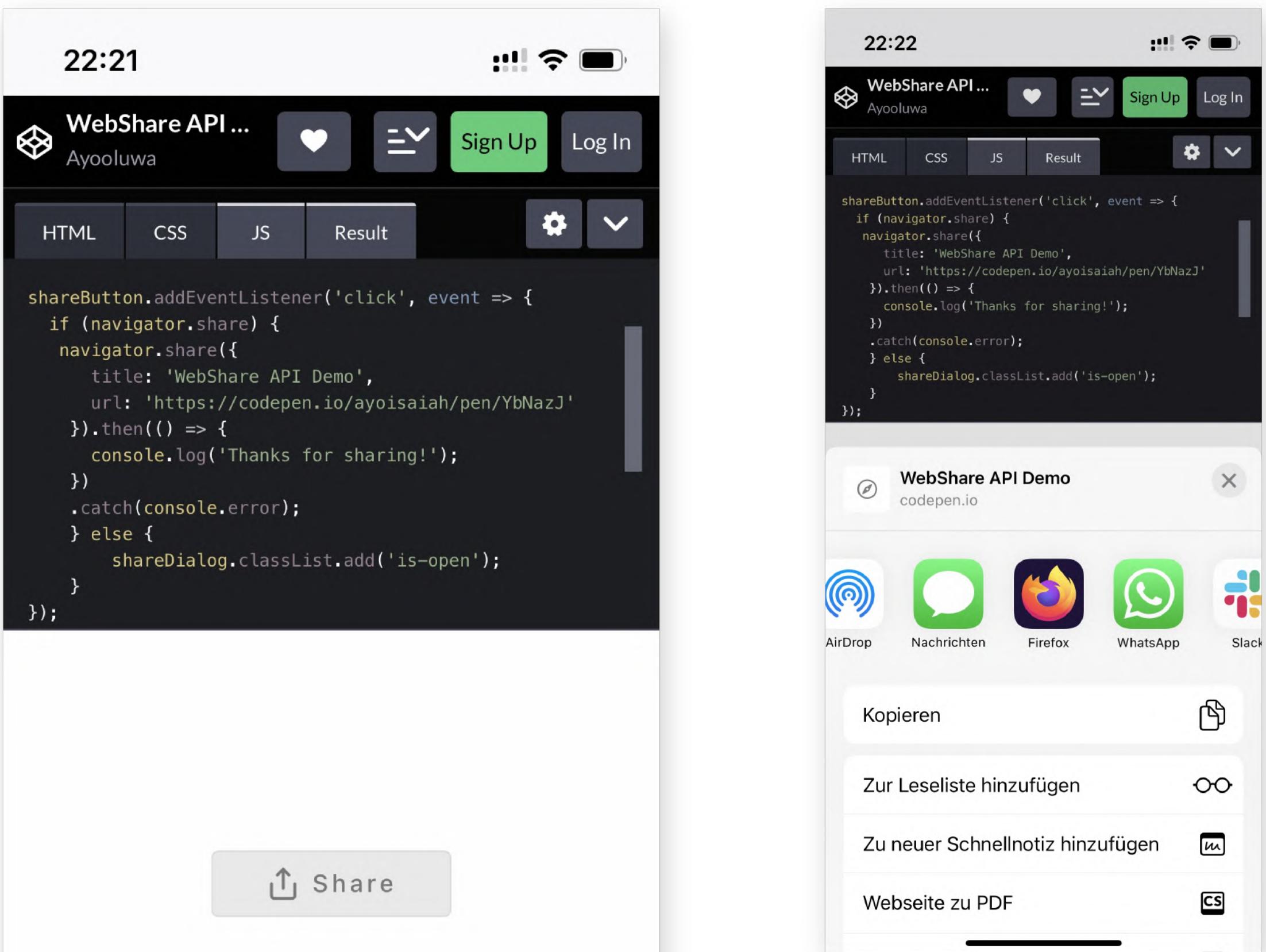


```
<input id="lowercaseFoodWithB" type="text"  
      required minlength="4" maxlength="20"  
      pattern="b[a-z]" />  
  
<input name="pin" type="password" required  
      pattern="\d{4,4}" />
```

Avoid Code:
System
Features
nutzen

System Fonts
Dialog / Modal Feature
Formular Validierung
Sharing API

Sharing API



Avoid Code: System Features nutzen

System Fonts

Dialog / Modal Feature

Formular Validierung

Sharing API

Module/Nomodule für JS

Module / Nomodule für verschiedene JS Versionen

```
● ● ●

<script type="module" src="module.js"></script>
<!-- ES6 Module mit export/import, const, default Parameters, classes, template literals, destructuring, ... --&gt;

&lt;script nomodule src="fallback.js"&gt;&lt;/script&gt;
<!-- Babel-Version mit Fallback-Syntax --&gt;</pre>
```

Avoid Code: System Features nutzen

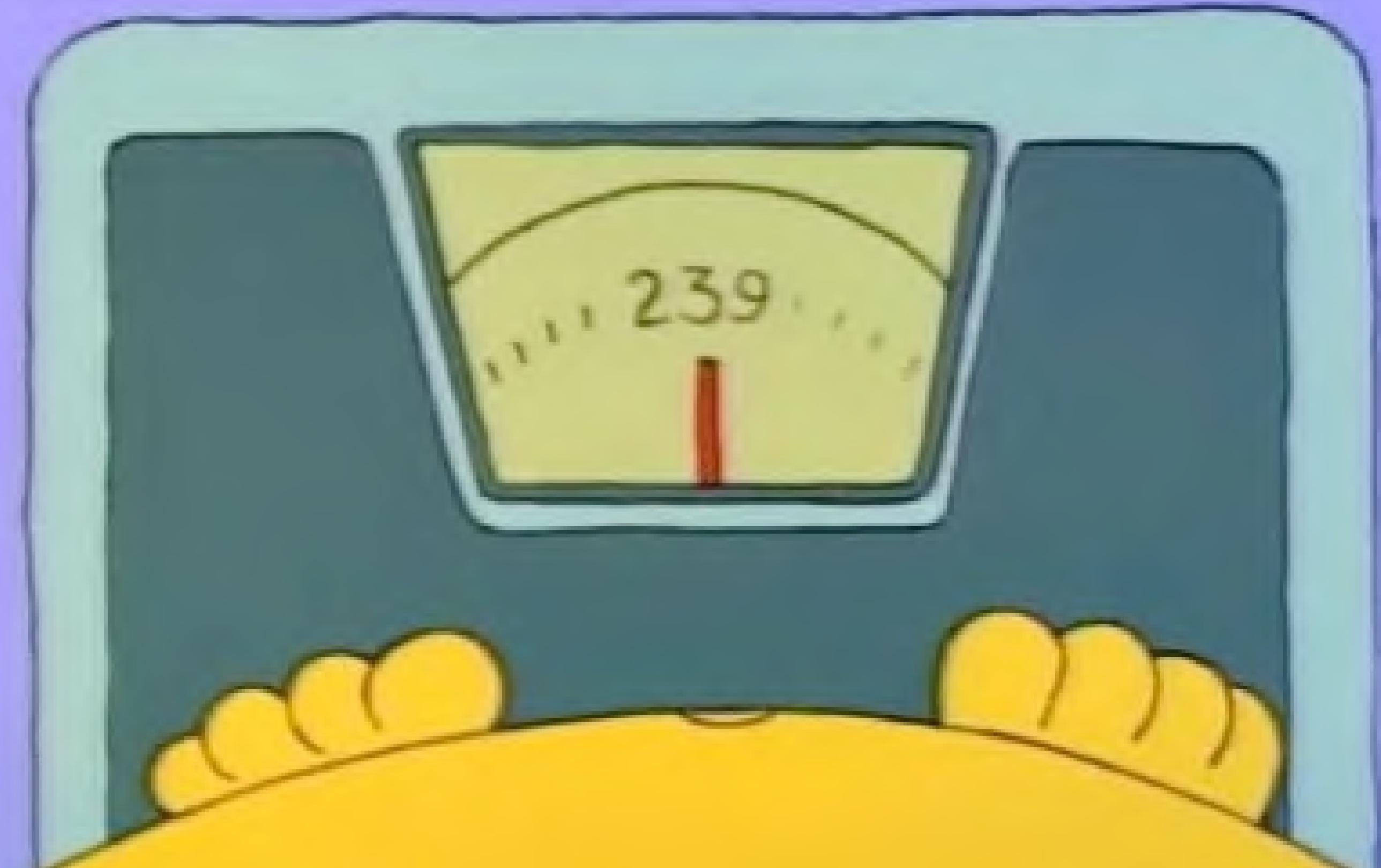
- System Fonts
- Dialog / Modal Feature
- Formular Validierung
- Sharing API
- Module/Nomodule für JS

... you get the point!

Drei Fünf Säulen von Website Performance



Reduce

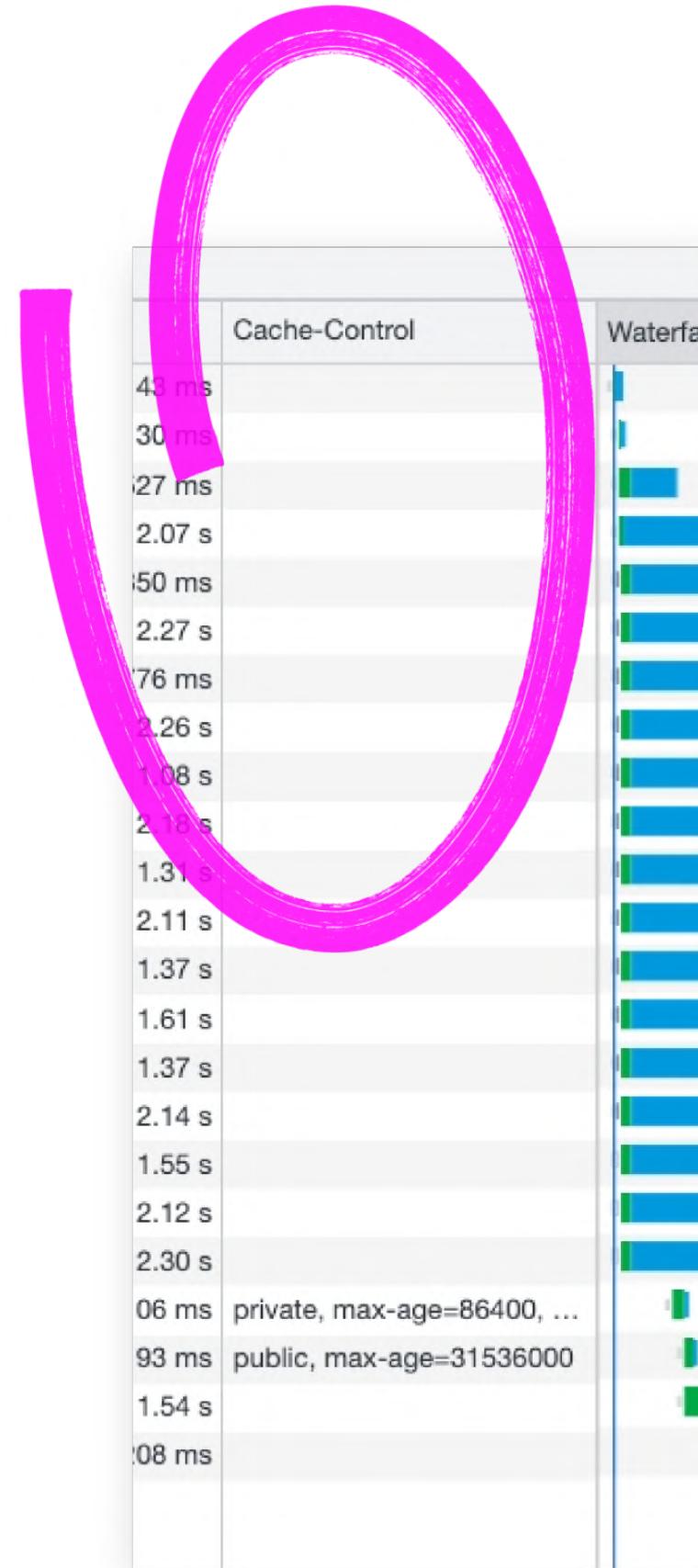


Reduce

Caching

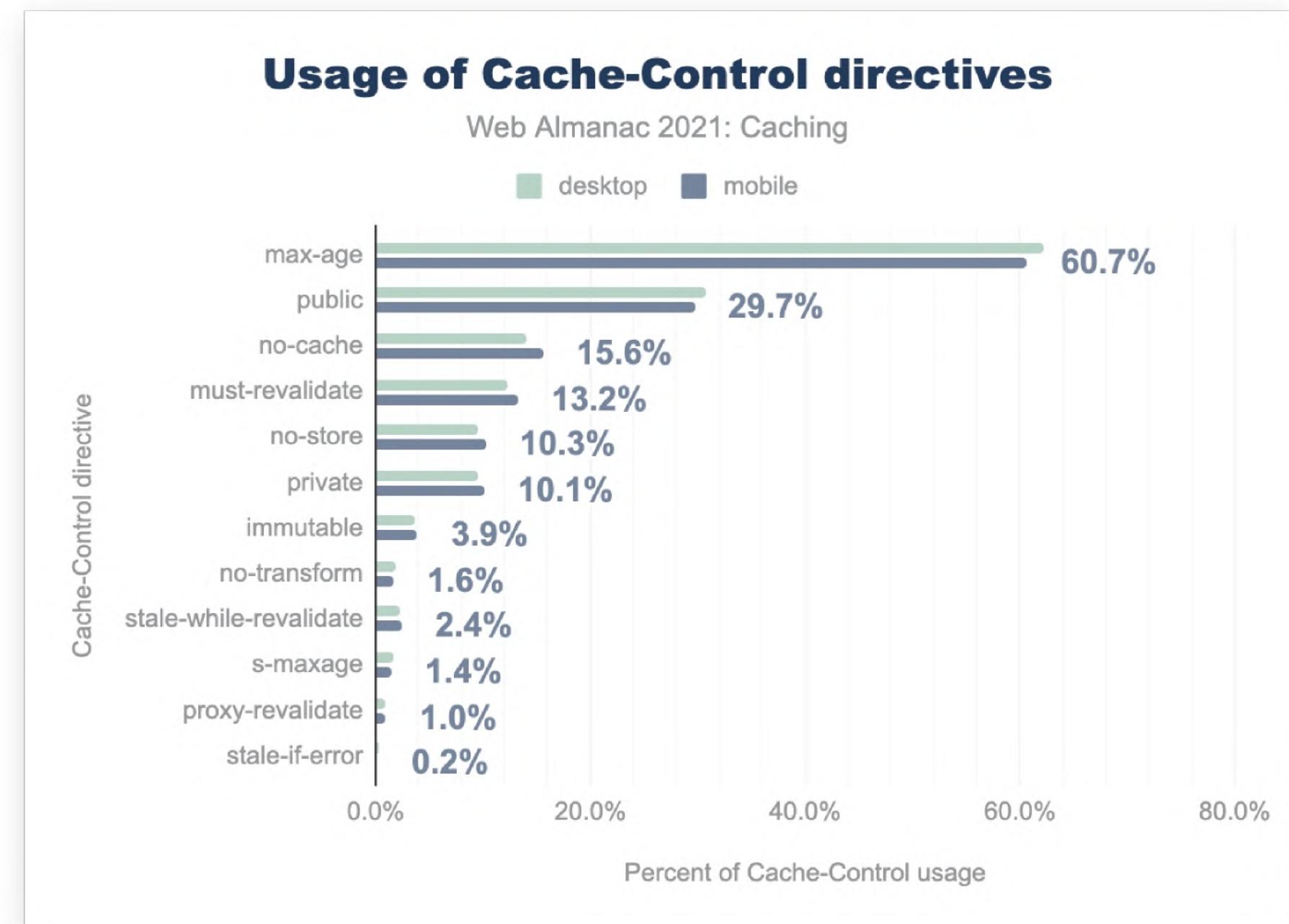
Caching und CDN / Proxy Cache

- deutliches Alarmsignal
- wird dir von jedem Testing Tool um die Ohren gehauen
- kurze Cache-Zeiten sollten gut begründet sein
- `immutable` nutzen!



Caching und CDN / Proxy Cache

- deutliches Alarmsignal
- wird dir von jedem Testing Tool um die Ohren gehauen
- kurze Cache-Zeiten sollten gut begründet sein
- `immutable` nutzen!



Reduce

Caching

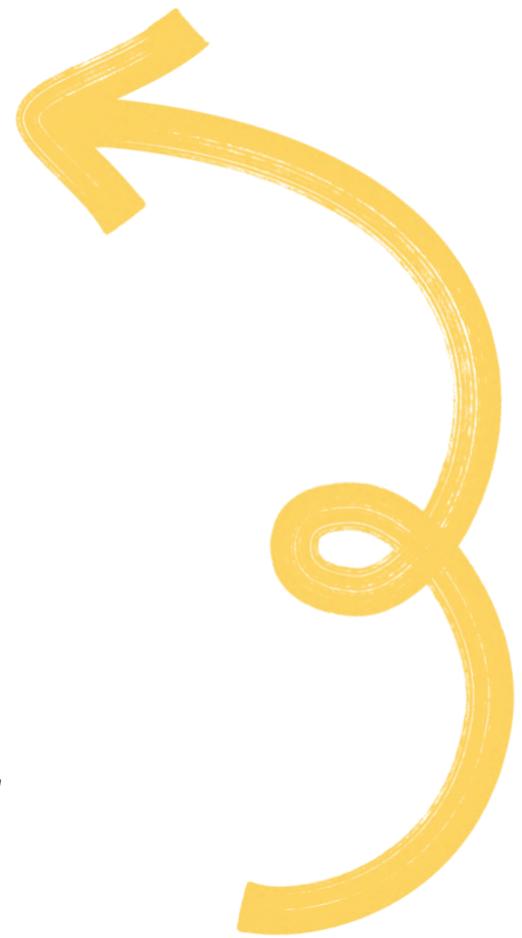
Komprimierung

Komprimierung: gzip, brotli

- Gzip als default, drop-in-Lösung
- brotli komprimiert 15–30% besser, aber
 - geringerer Browser-Support (93%)
 - dynamische Komprimierung dauert länger
 - Tweaking der 9 gzip und 11 brotli Stufen

Komprimierung: gzip, brotli

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 - Tweaking der 9 gzip und 11 brotli Stufen



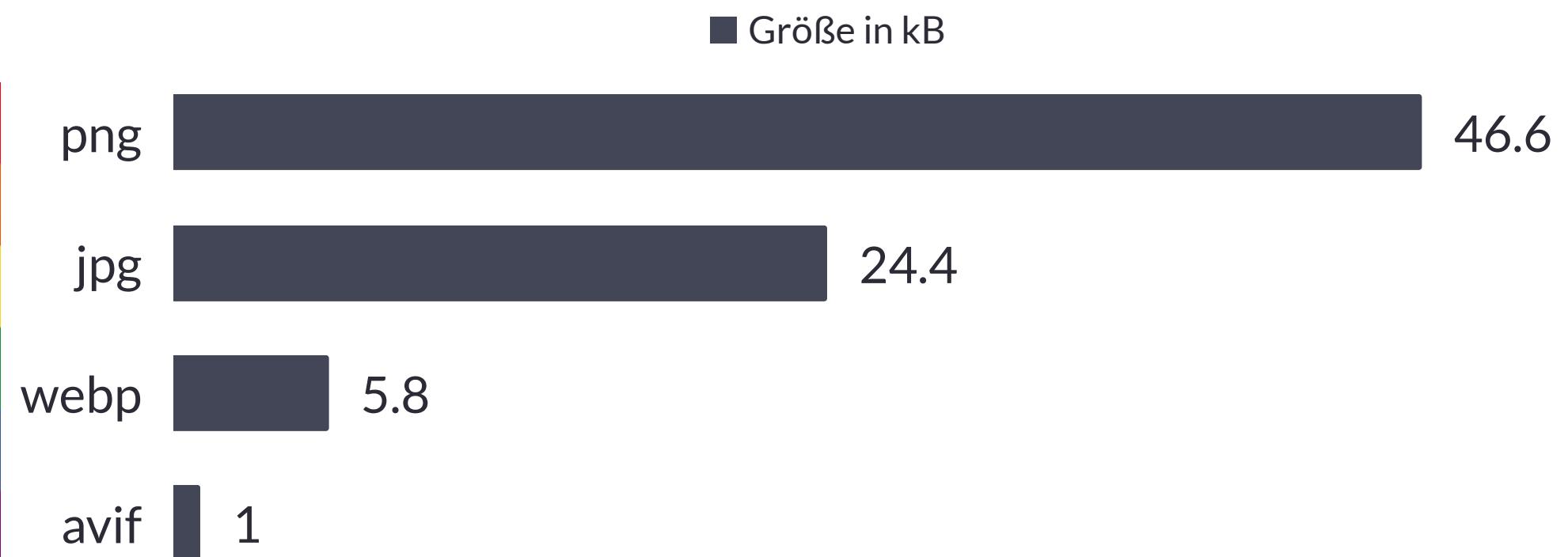
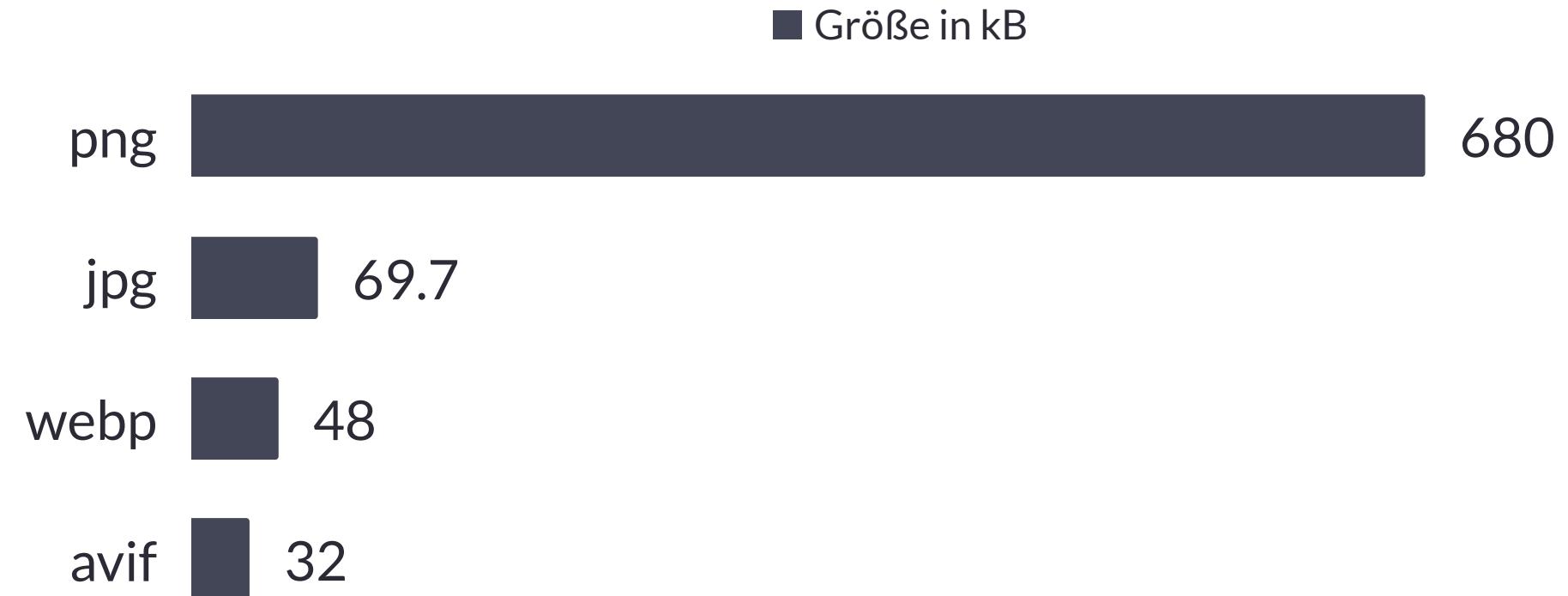
Reduce

Caching

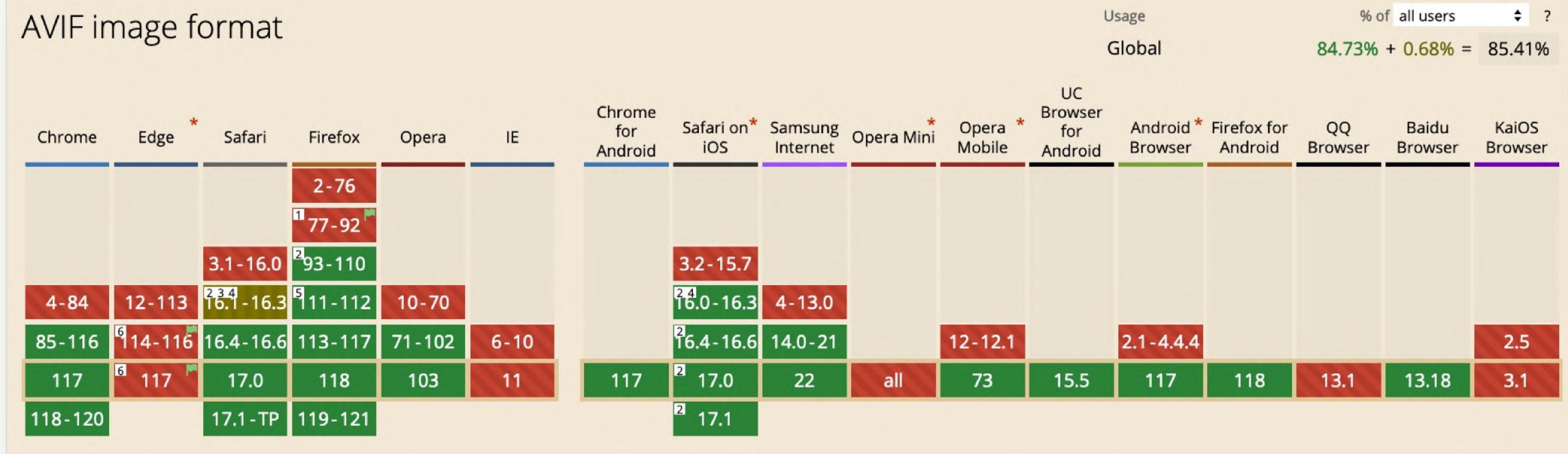
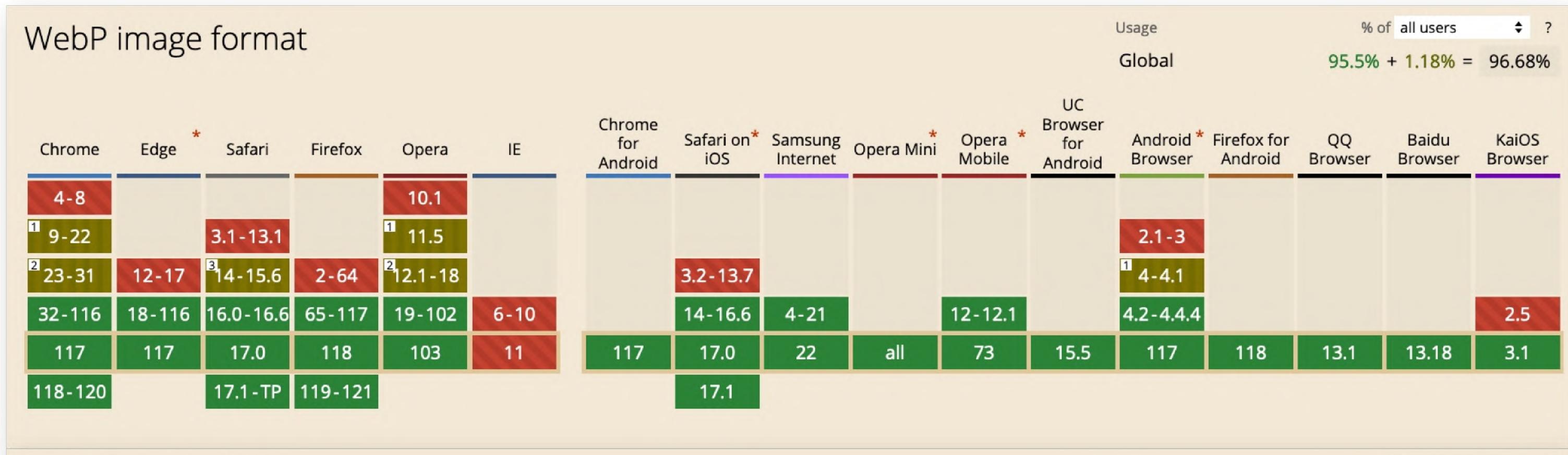
Komprimierung

Bildformate

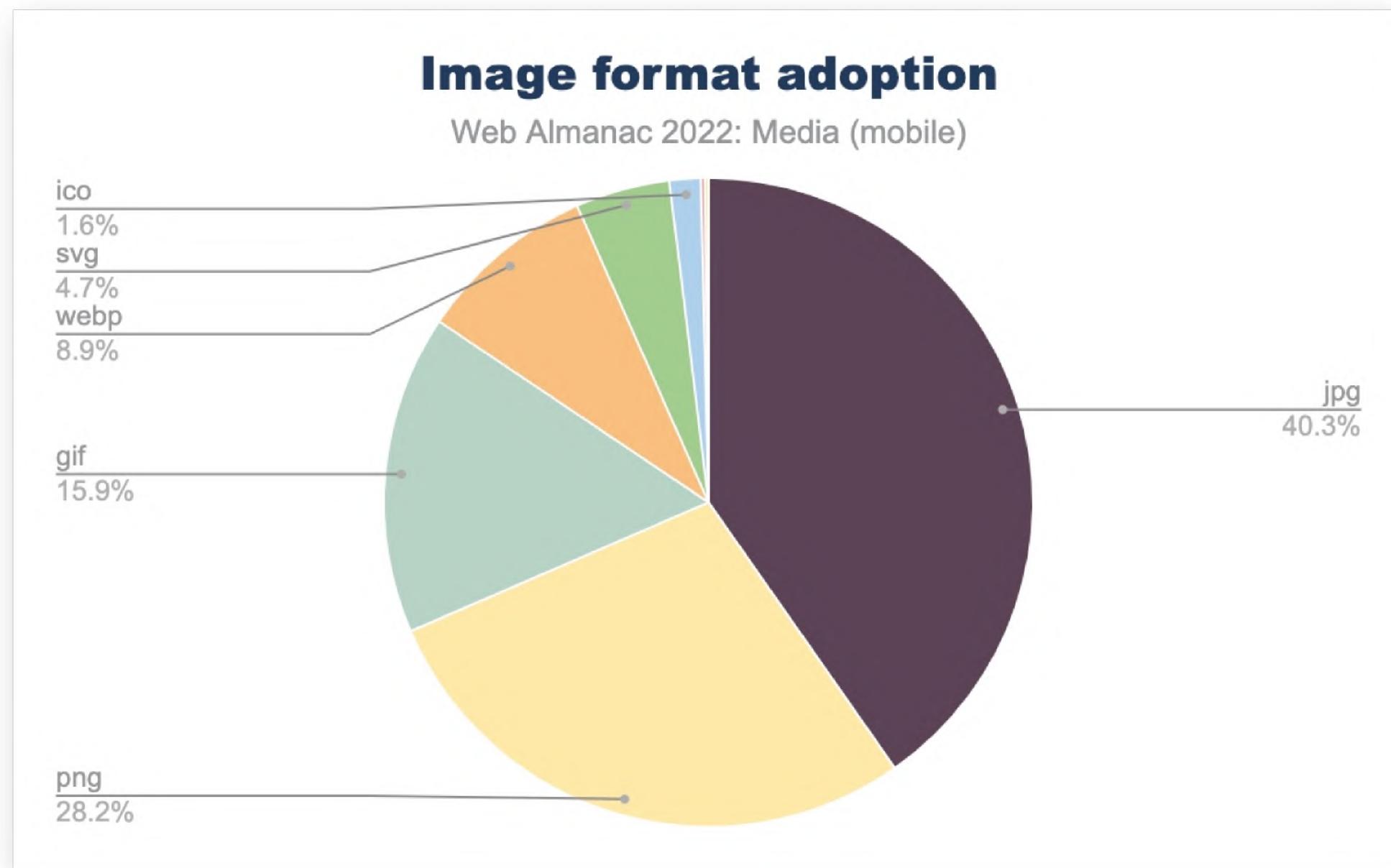
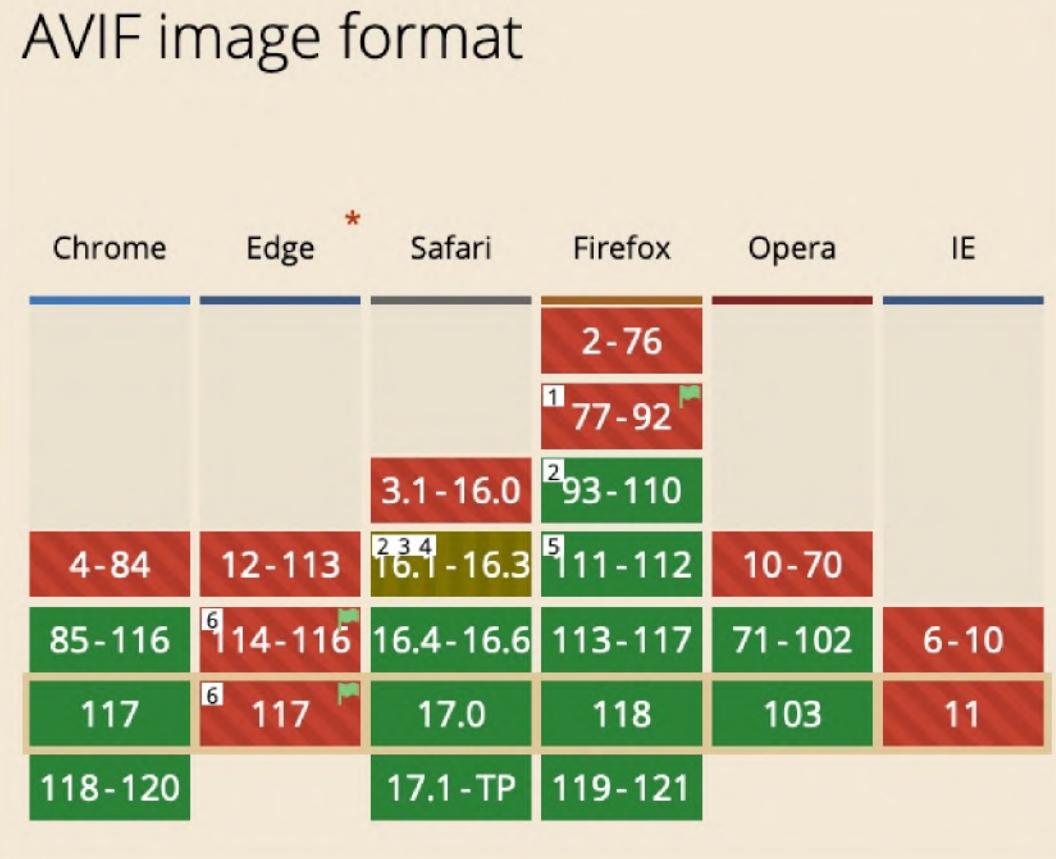
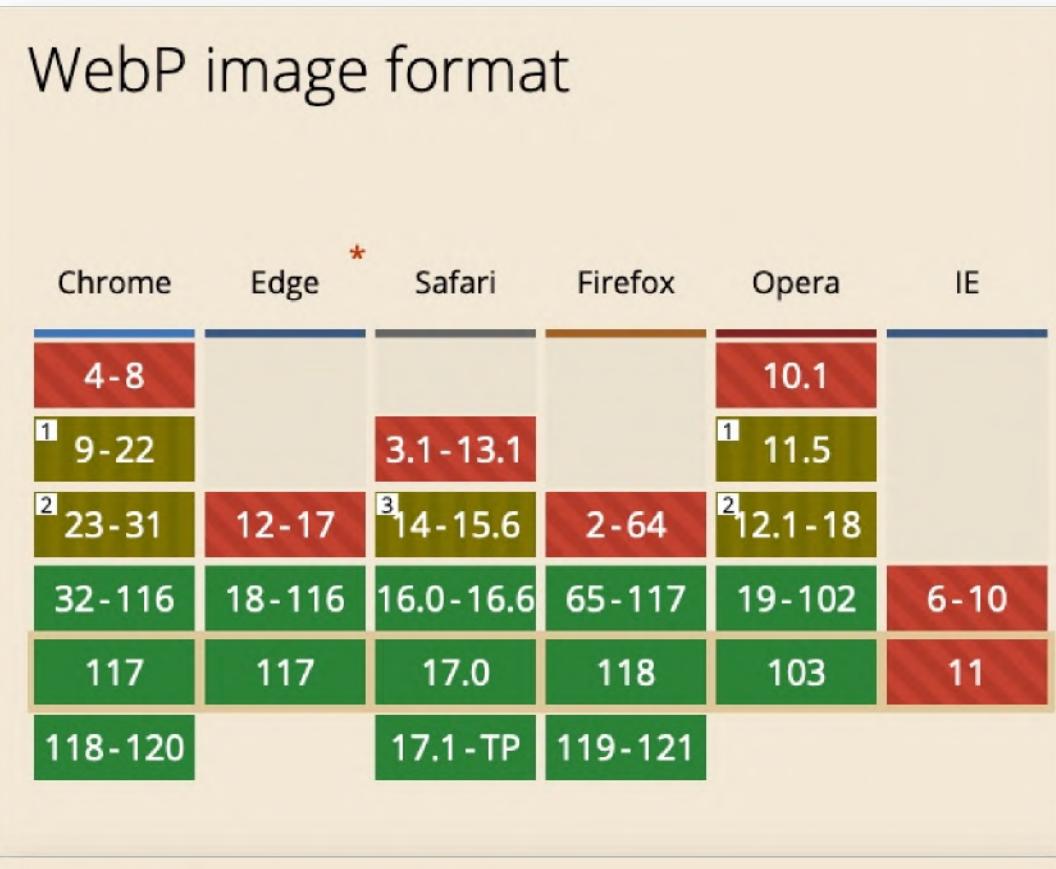
WebP / Avif : Vorteile



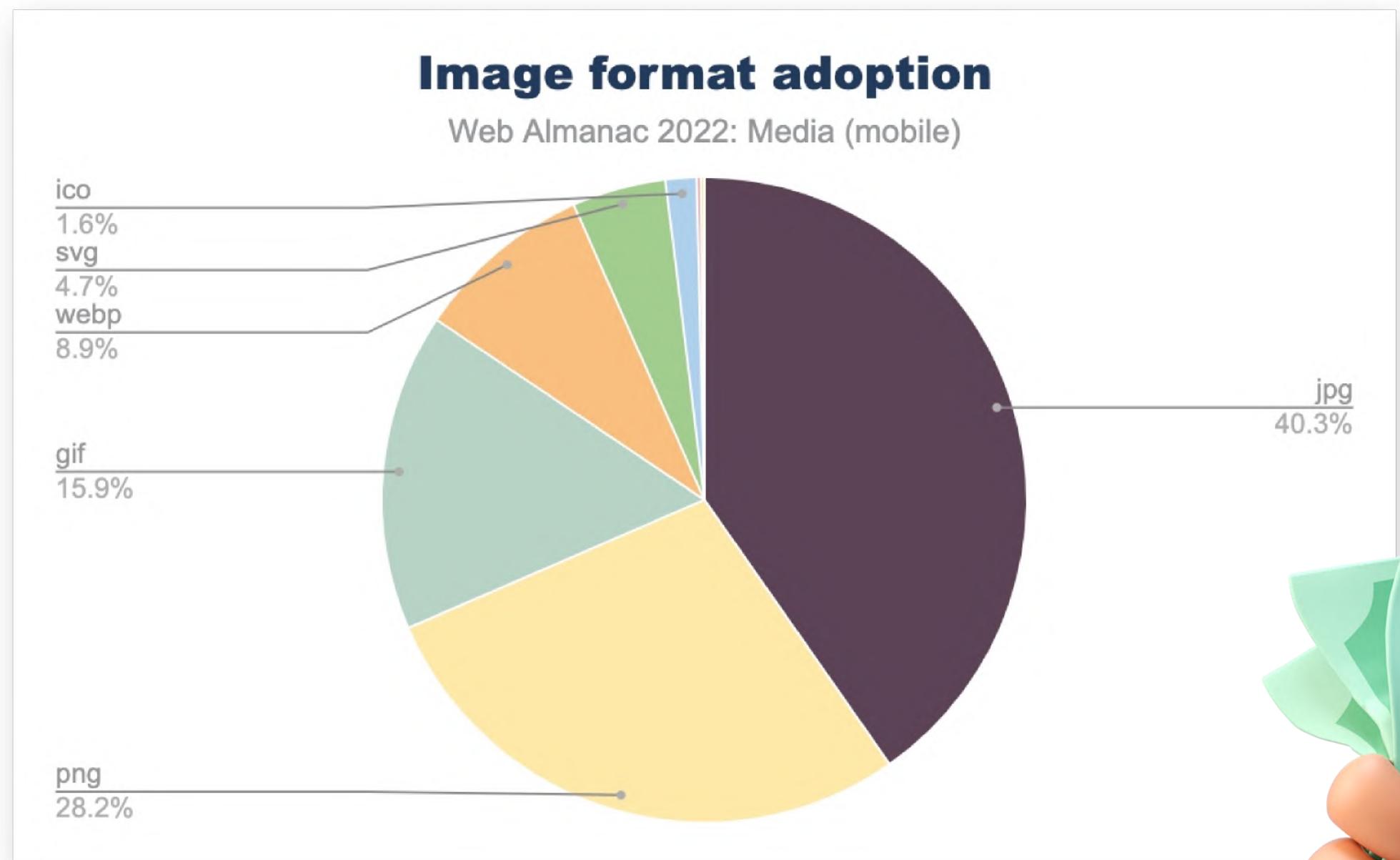
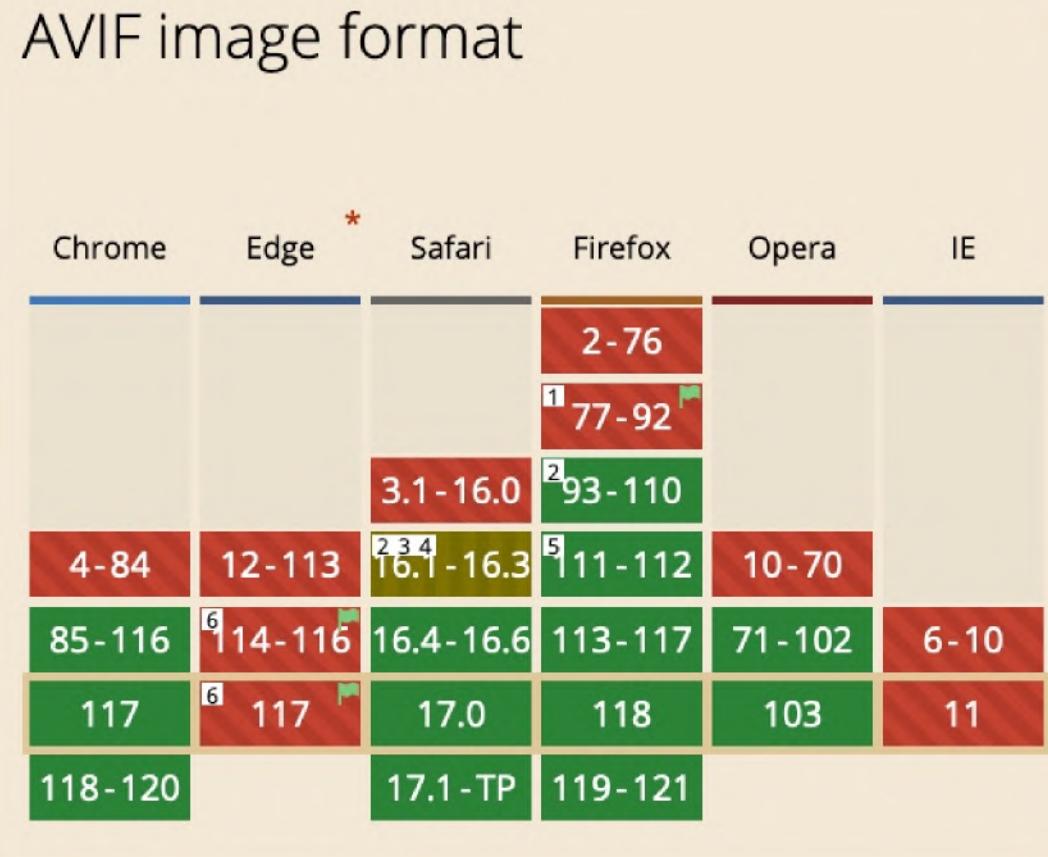
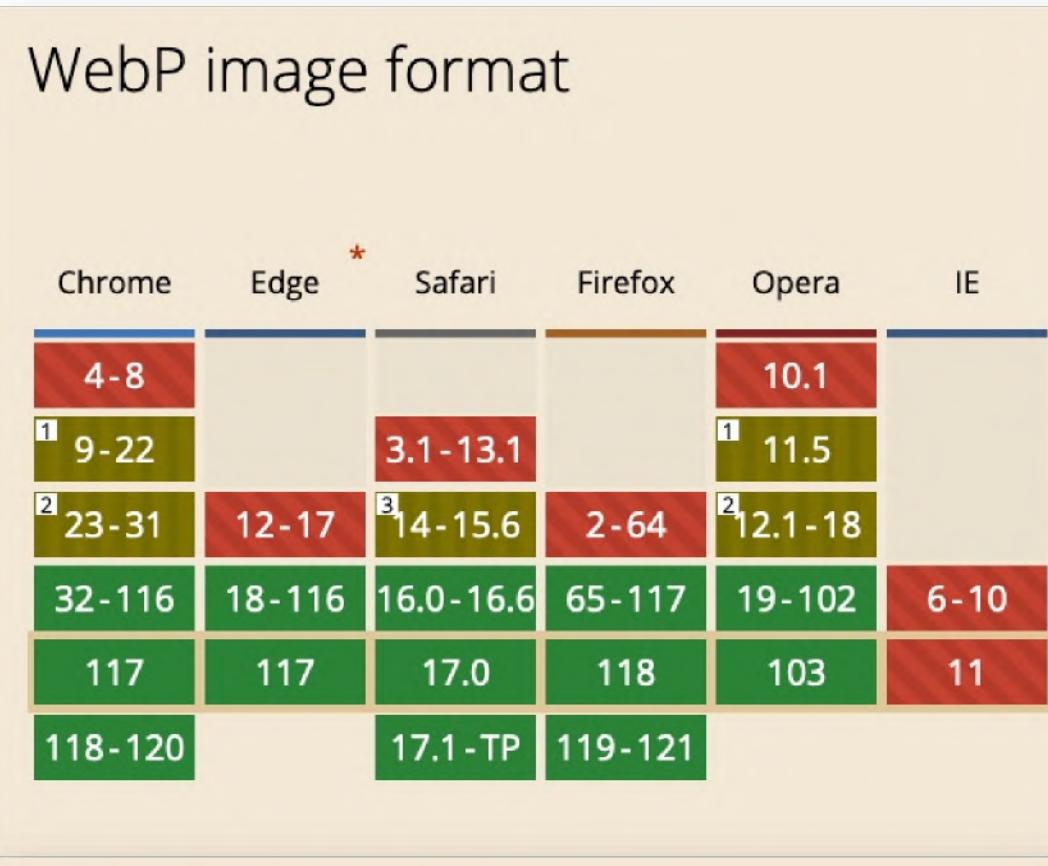
WebP / Avif: Unterstützung



WebP / Avif : Nutzung



WebP / Avif : Wettbewerbsvorteil!



WebP / Avif : Einsatz



Squoosh

npm



Natural Preference for Minification



○ ○ ○

```
npx image-cli-tools ./images/*.png -webp  
# oder  
cwebp images/flower.jpg -o images/flower.webp
```



```
<picture>  
  <source srcset="img/photo.avif" type="image/avif">  
  <source srcset="img/photo.webp" type="image/webp">  
    
</picture>
```

Reduce

Bildkomprimierung: Testing-Tools

Lighthouse im Browser
oder Web.

webspeedtest.cloudinary.com

■ Serve images in next-gen formats 0.52s

Image formats like WebP and AVIF often provide better compression than PNG or JPEG, which means faster downloads and less data consumption. [Learn more about modern image formats.](#)

URL	Resource Size	Potential Savings
thomaspuppe.de 1st Party	2,178.9 KiB	1,514.9 KiB
 <small>i m g ...png/event-funeral.png (lama.thomaspuppe.de)</small>	302.3 KiB	232.4 KiB

B blog-both.jpg

JPEG 66.8 KB Current

Potential Smart Compression

 **35.2%**
Reduction in image weight
1200x384 → 1200x384

Image format options with file size and % compared to current

Format	File Size	Change from Current (%)
JPEG	58.3 KB	(-12.7%)
WEBP	50.9 KB	(-23.8%)
AVIF	43.2 KB	(-35.2%)
PNG	138.3 KB	(+107.1%)

[SEE DETAILS ▾](#)

Bildkomprimierung: ...



Bildkomprimierung: SVG!



- SVGOptimize
- SVGOMG

Reduce

Caching

Komprimierung

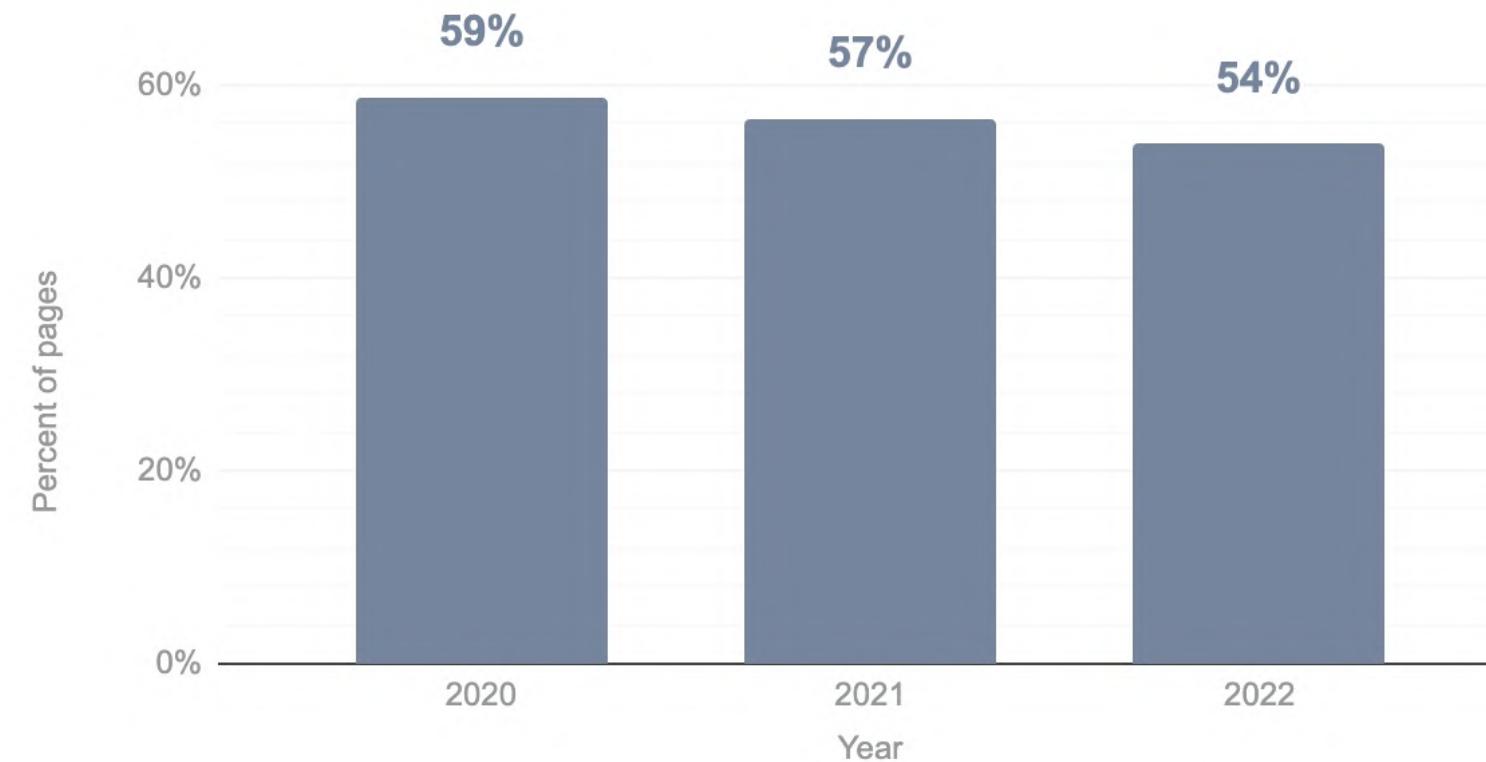
Bildformate

Responsive Images

Responsive Images

Properly sized images

Web Almanac 2022: Mobile Web

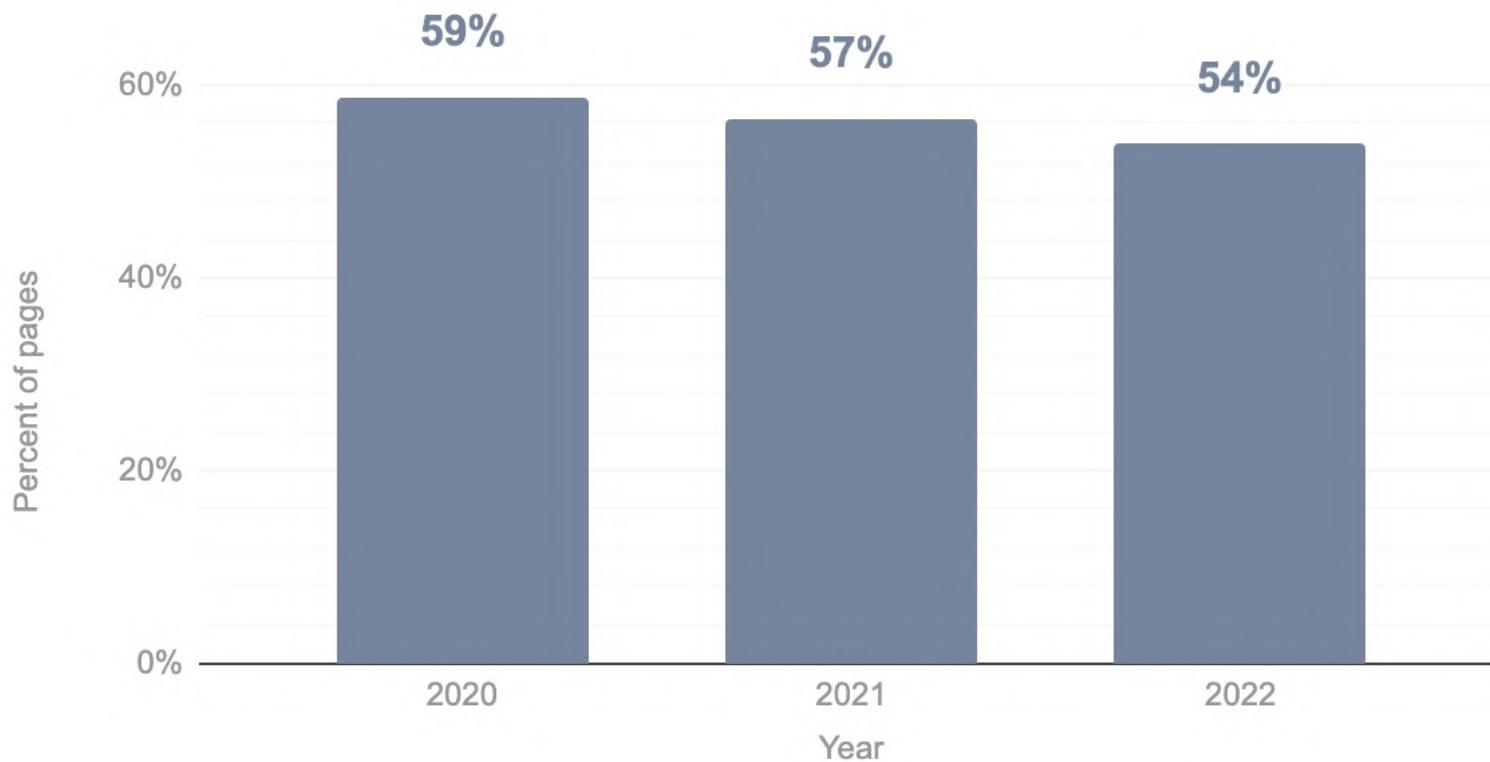


Credit: <httparchive.org>

Responsive Images

Properly sized images

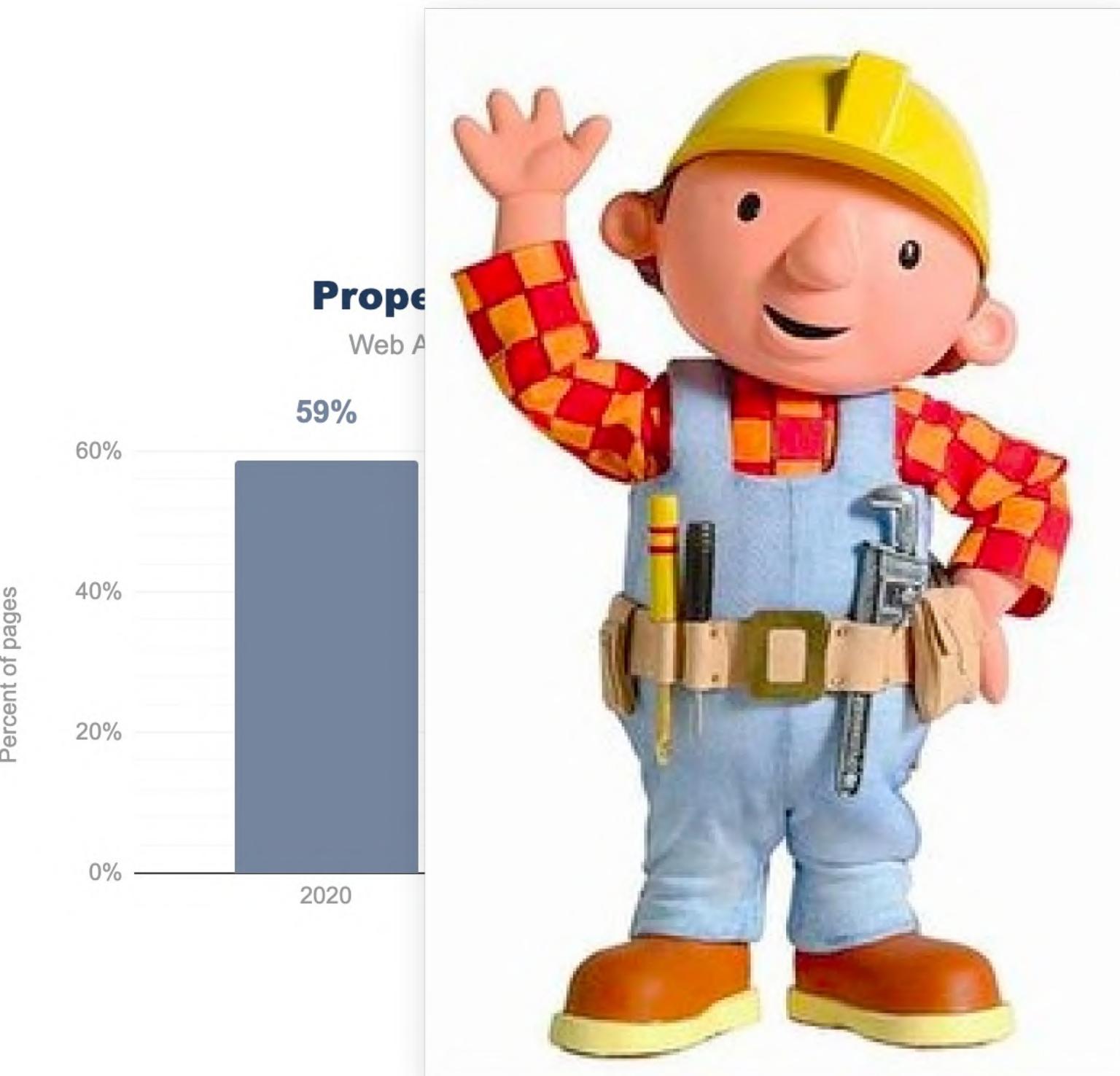
Web Almanac 2022: Mobile Web



Credit: <httparchive.org>



Responsive Images



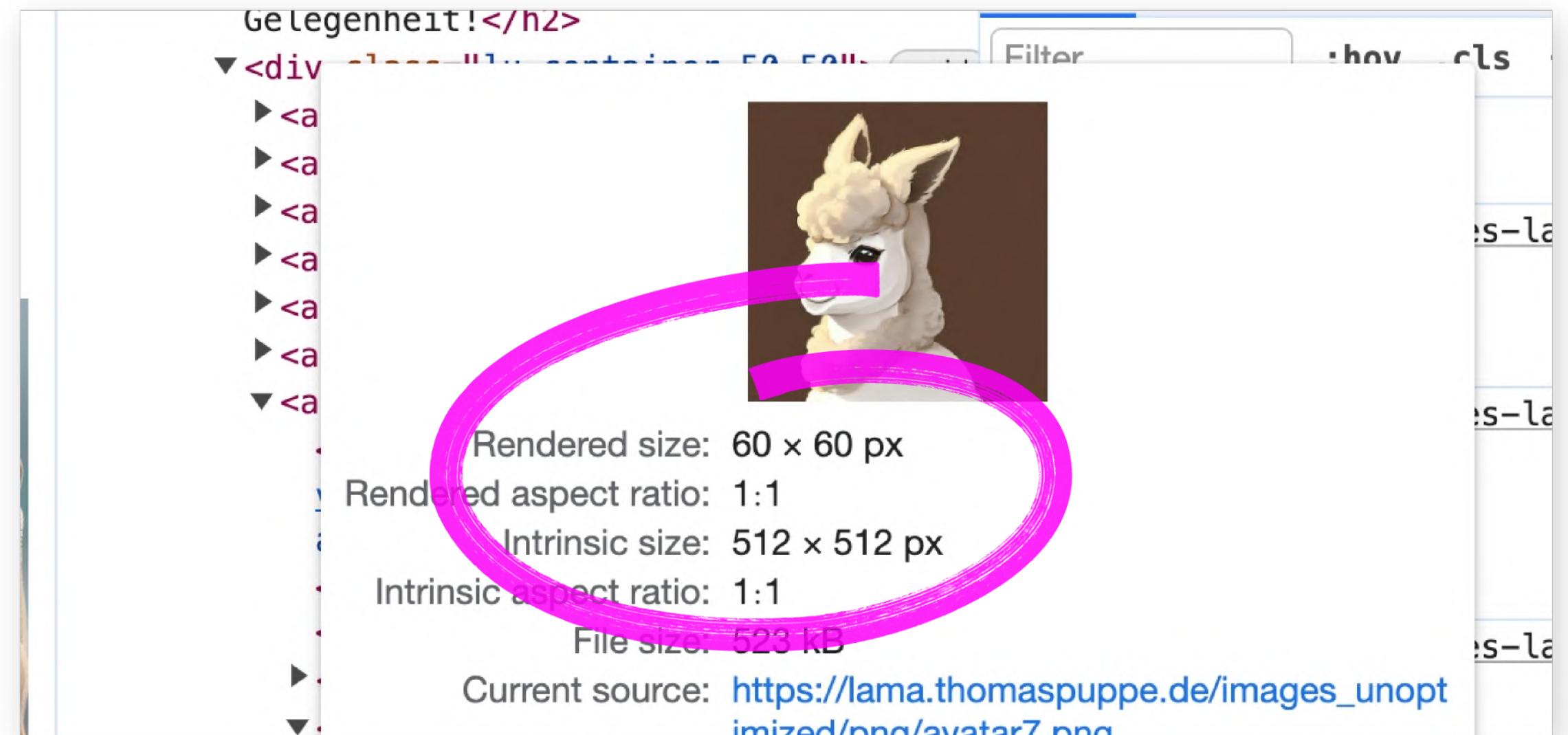
Credit: <httparchive.org>



Responsive Images



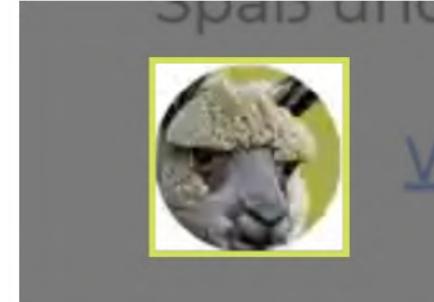
Responsive Images checken



Responsive Images checken

▲ Properly size images 4.62s ^

Serve images that are appropriately-sized to save cellular data and improve load time. [Learn how to size images.](#)

URL	Resource Size	Potential Savings
thomaspuppe.de 1st Party	13,874.8 KiB	5,878.4 KiB
 i m g ...png/avatar8.png (lama.thomaspuppe.de)	1,495.6 KiB	1,459.1 KiB

Reduce

Responsive Images Checker

[https://toolsaday.com/seo/
responsive-image-checker](https://toolsaday.com/seo/responsive-image-checker)

SEO TOOLS

- Open Graph Checker
- HTTP Status Checker
- Redirect Checker
- Gzip Checker
- Web Page Size Checker
- Canonical URL Checker

https://lama.thomaspuppe.de/before.html Check

Check if all of your page's images are appropriately sized for your user's viewport.

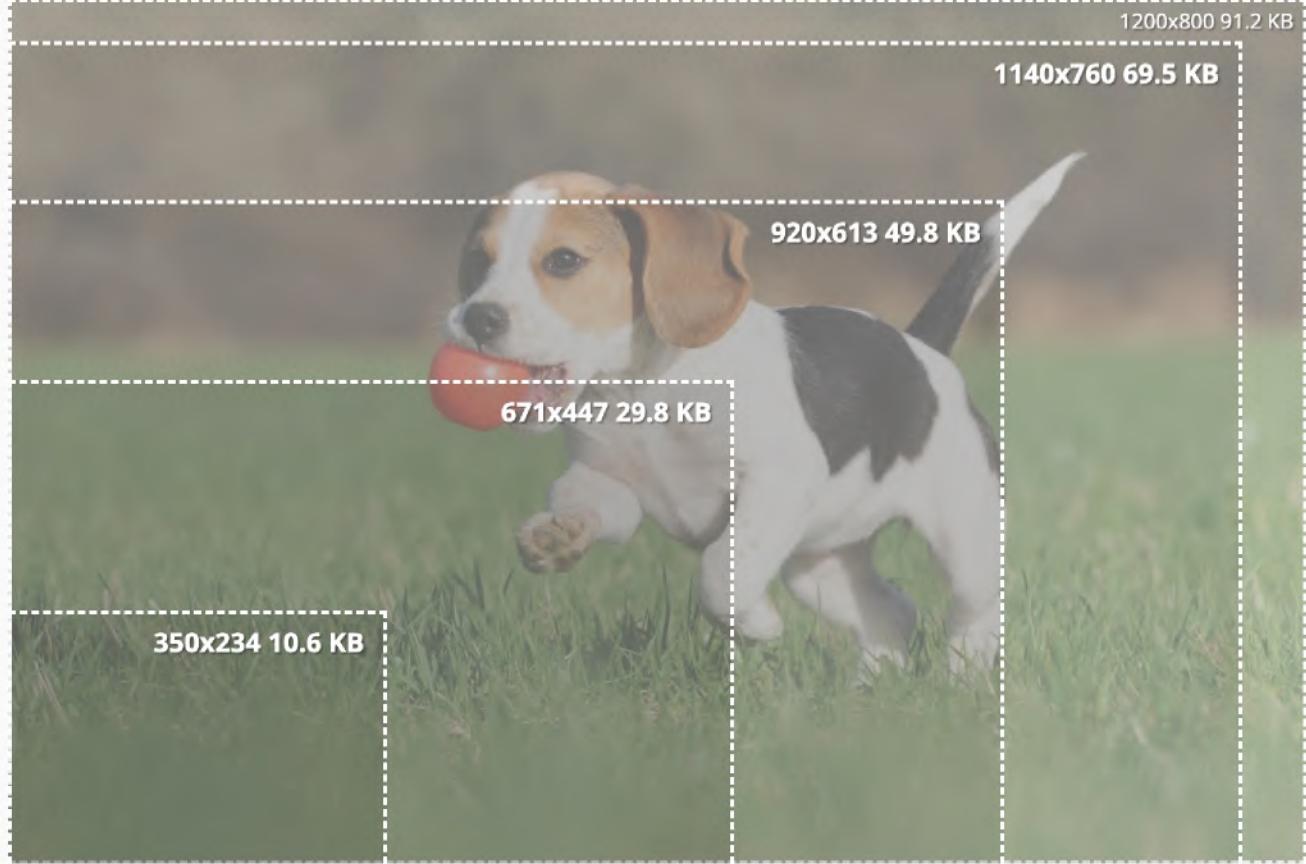
Preview	Display Size	Natural Size
	397x224	1000x566

Responsive Images

Verwendung

1) Erzeugung

No	Width	Height	File size	
1	350	234	10.6 KB	View image
2	671	447	29.8 KB	View image
3	920	613	49.8 KB	View image
4	1140	760	69.5 KB	View image
5	1200	800	91.2 KB	View image



The image shows a Beagle puppy running through a grassy field, carrying a red ball in its mouth. Overlaid on the image are five dashed white boxes of increasing size from bottom-left to top-right, representing different image resolutions and their corresponding dimensions and file sizes:

- Bottom-left box: 350x234 10.6 KB
- Middle-left box: 671x447 29.8 KB
- Middle-right box: 920x613 49.8 KB
- Top-right box: 1140x760 69.5 KB
- Top-right corner box: 1200x800 91.2 KB

<https://responsivebreakpoints.com/>

Responsive Images

Verwendung

1) Erzeugung

2) Einbindung

```

```

```
<picture>  
  <source  
    media="(max-width: 480px)"  
    srcset="cute-dog__480x480__mobile,  
           cute-dog__480x480__mobile__scale_2 2x"/>  
  <source  
    media="(max-width: 767px)"  
    srcset="cute-dog__767x767__mobile,  
           cute-dog__767x767__mobile__scale_2 2x"/>  
  <source  
    media="(max-width: 900px)"  
    srcset="cute-dog__900x506__desktop,  
           cute-dog__900x506__desktop__scale_2 2x"/>  
  <source  
    srcset="cute-dog__1000x562__desktop,  
           cute-dog__1000x562__desktop__scale_2 2x"/>  
    
</picture>
```

Bildformate und Responsive Images

Bildformat checken:

webspeedtest.cloudinary.com

Responsive Images checken:

toolsaday.com/seo/responsive-image-checker

hands-on



Credit: Pitch Sticker "Cyberpunk"

Reduce

Caching

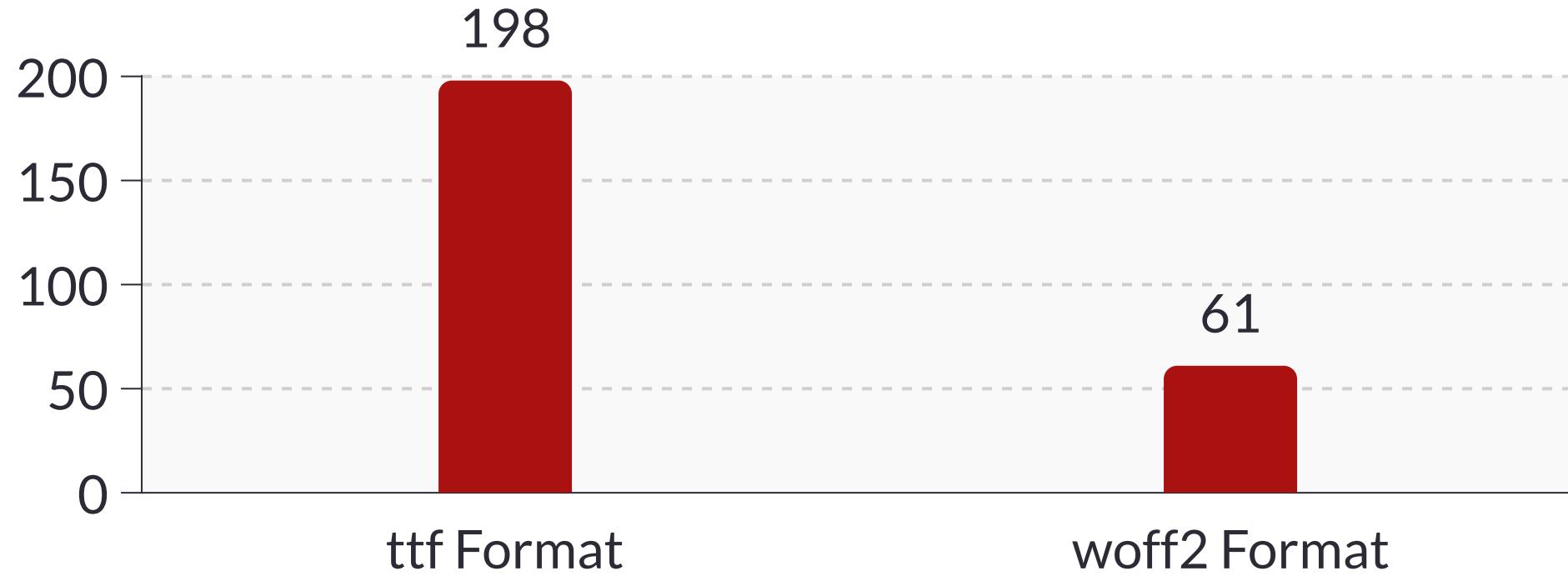
Komprimierung

Bildformate

Responsive Images

Schriften: woff2 Format

Schriften: Woff 2 Format



- Vergesst andere Formate!
- Hervorragender Browser-Support
- Kompatibilität mit alten Browsern
wollen wir nicht.

Reduce

Caching

Komprimierung

Bildformate

Responsive Images

Schriften: woff2 Format

Schriften: Subsetting

Reduce

Schriften: Subsetting

- <https://wakamaifondue.com>
für Schriften-Eigenschaften

Montserrat Regular

This is a **TrueType** font with **969 characters**. It has **24 layout features**

Reduce

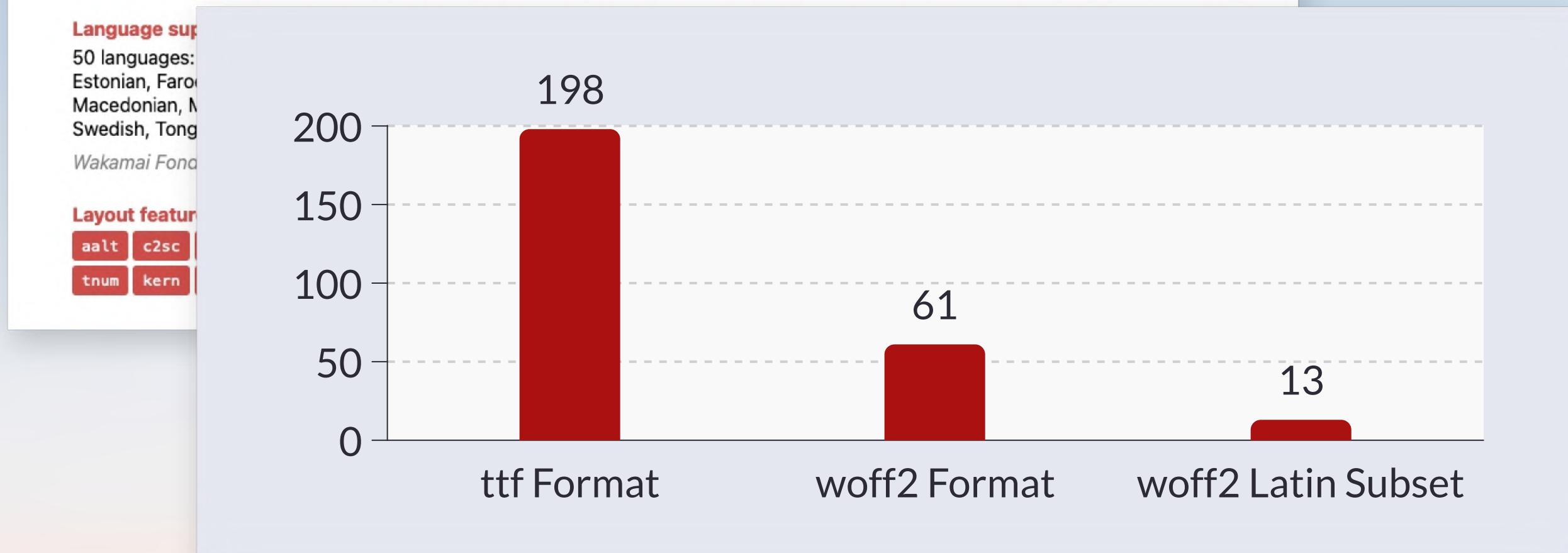
Schriften: Subsetting

- <https://wakamaifondue.com> für Schriften-Eigenschaften
- <https://everythingfonts.com/subsetter> als Subsetting-GUI
- <https://www.zachleat.com/web/glyphhanger> als Subsetting-CLI mit Unicode-Range und automatischer Erkennung der Inhalte
- <https://transfonter.org/>

Montserrat Regular

This is a **TrueType** font with **969 characters**. It has **24 layout features**.

Characters	Glyphs	Layout features	Languages
969	1909	24	50
Filename		Size	Format
Montserrat-Regular.woff2		60 KB	WOFF2
Designed by		Manufactured by	
Julieta Ulanovsky		Julieta Ulanovsky	
Copyright		Version	
Copyright 2011 The Montserrat Project Authors (https://github.com/JulietaUla/Montserrat)		Version 8.000	
License			
This Font Software is licensed under the SIL Open Font License, Version 1.1. This license is available with a FAQ at: http://scripts.sil.org/OFL			



Webfonts

Woff2 und Subsetting

- Benutzt du woff2? Und/oder andere Formate?
Vergleiche die Größe.
<https://transfonter.org>
- Was kann dein Font-File?
<https://wakamaifondue.com>
- Erstelle ein passendes Subset.
<https://everythingfonts.com/subsetter>

hands-on



Credit: Pitch Sticker "Cyberpunk"

Reduce

Caching

Komprimierung

Bildformate

Responsive Images

Schriften: woff2 Format

Schriften: Subsetting

Fünf Säulen von Website Performance

A R O M A

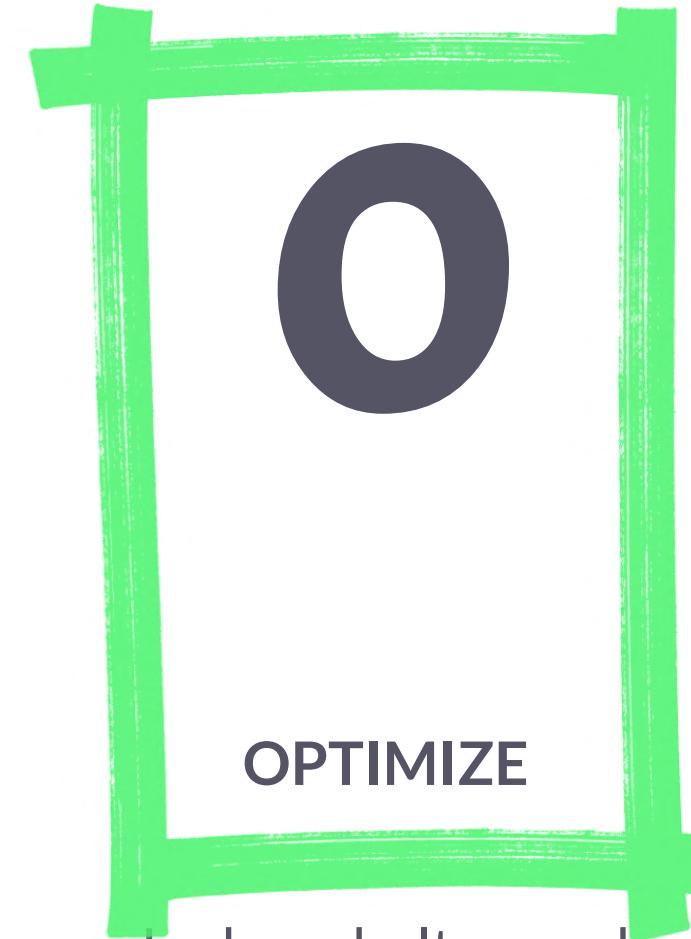
AVOID

Benutzen wir alles?

Brauchen wir alles?

REDUCE

Cachen,
Komprimieren,
Minimieren.



MEASURE

Tooling und
Monitoring

ATTITUDE

Performance
Culture

Pause



Credit: Pitch Sticker "Cyberpunk"

Optimize



Optimize

Lazy Loading

Lazy Loading

The screenshot shows the npm search interface. At the top, there's a navigation bar with links for 'Newly Purchased Memories', 'Pro', 'Teams', 'Pricing', and 'Documentation'. Below that is the npm logo and a search bar containing the query 'lazy load'. To the right of the search bar are 'Search', 'Sign Up', and 'Sign In' buttons. The main content area displays the results: '1464 packages found' with a page navigation bar showing pages 1 through 74.

Unpacked Size	Total Files
219 kB	12
Issues	Pull Requests
7	3
Last publish	
7 months ago	

Unpacked Size	Total Files
14.3 kB	5
Issues	Pull Requests
71	38
Last publish	
4 years ago	

Unpacked Size	Total Files
336 kB	80
Issues	Pull Requests
165	34
Last publish	
2 years ago	

Lazy Loading via JavaScript



```

```

```
● ● ●  
  
const images = document.querySelectorAll('img[data-src]');  
const options = { rootMargin: '0px', threshold: 0.5 };  
const observer = new IntersectionObserver(entries, observer) => {  
  entries.forEach(entry => {  
    if (entry.isIntersecting) {  
      const image = entry.target;  
      const src = image.getAttribute('data-src');  
      image.setAttribute('src', src);  
      image.removeAttribute('data-src');  
      observer.unobserve(image);  
    }  
  });  
}, options);  
images.forEach(image => {  
  observer.observe(image);  
});
```

Lazy Loading via JavaScript



A screenshot of a browser window. At the top, there are three colored dots (red, yellow, green). Below them, the page content starts with an tag. The code for the tag is shown in green: . A red box highlights the 'img' tag. Below the code, an error message is displayed in a red box: 'Error Element img is missing required attribute src'. Underneath the error message, it says 'From line 72, column 17; to line 72, column 69'. A yellow box highlights the 'data-src' attribute in the original code.

```
const images = document.querySelectorAll('img[data-src]');
const options = { rootMargin: '0px', threshold: 0.5 };
const observer = new IntersectionObserver(entries, observer) => {
  entries.forEach(entry => {
    if (entry.isIntersecting) {
      const image = entry.target;
      const src = image.getAttribute('data-src');
      image.setAttribute('src', src);
      image.removeAttribute('data-src');
      observer.unobserve(image);
    }
  });
}, options);
images.forEach(image => {
  observer.observe(image);
});
```

Lazy Loading via JavaScript

The screenshot shows a browser developer tools console with the following content:

```
const images = document.querySelectorAll('img[data-src]');
const options = { rootMargin: '0px', threshold: 0.5 };
const observer = new IntersectionObserver(entries, observer) => {
  entries.forEach(entry => {
    if (entry.isIntersecting) {
      const image = entry.target;
      const src = image.getAttribute('data-src');
      image.setAttribute('src', src);
      image.removeAttribute('data-src');
      observer.unobserve(image);
    }
  });
}, options);
images.forEach(image => {
  observer.observe(image);
});
```

Error Element `img` is missing required attribute `src`.
From line 72, column 17; to line 72, column 69

```

```

auf JavaScript angewiesen

The screenshot shows a browser developer tools console with the following content:

```
const images = document.querySelectorAll('img[data-src]');
const options = { rootMargin: '0px', threshold: 0.5 };
const observer = new IntersectionObserver(entries, observer) => {
  entries.forEach(entry => {
    if (entry.isIntersecting) {
      const image = entry.target;
      const src = image.getAttribute('data-src');
      image.setAttribute('src', src);
      image.removeAttribute('data-src');
      observer.unobserve(image);
    }
  });
}, options);
images.forEach(image => {
  observer.observe(image);
});
```

Lazy Loading via JavaScript

The screenshot shows a browser developer tools console with the following output:

```
const images = document.querySelectorAll('img[data-src]');
const options = { rootMargin: '0px', threshold: 0.5 };
const observer = new IntersectionObserver(entries, observer) => {
  entries.forEach(entry => {
    if (entry.isIntersecting) {
      const image = entry.target;
      const src = image.getAttribute('data-src');
      image.setAttribute('src', src);
      image.removeAttribute('data-src');
      observer.unobserve(image);
    }
  });
}, options);
images.forEach(image => {
  observer.observe(image);
});
```

Error Element `img` is missing required attribute `src`.
From line 72, column 17; to line 72, column 69

```

```

auf JavaScript angewiesen

responsive Bilder und Retina?

The screenshot shows a browser developer tools console with the following output:

```
const images = document.querySelectorAll('img[data-src]');
const options = { rootMargin: '0px', threshold: 0.5 };
const observer = new IntersectionObserver(entries, observer) => {
  entries.forEach(entry => {
    if (entry.isIntersecting) {
      const image = entry.target;
      const src = image.getAttribute('data-src');
      image.setAttribute('src', src);
      image.removeAttribute('data-src');
      observer.unobserve(image);
    }
  });
}, options);
images.forEach(image => {
  observer.observe(image);
});
```

Lazy Loading nativ

Natives Lazyloading im Browser:



```

```

Lazy Loading nativ

Natives Lazyloading im Browser:



```

```

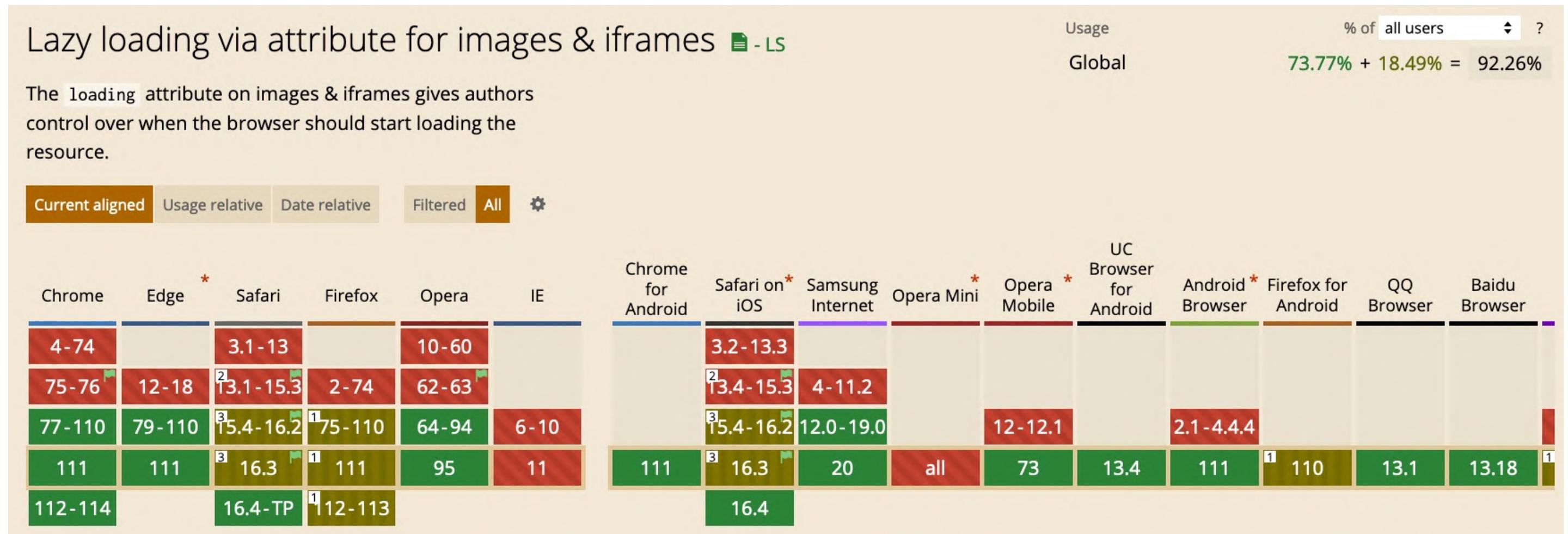
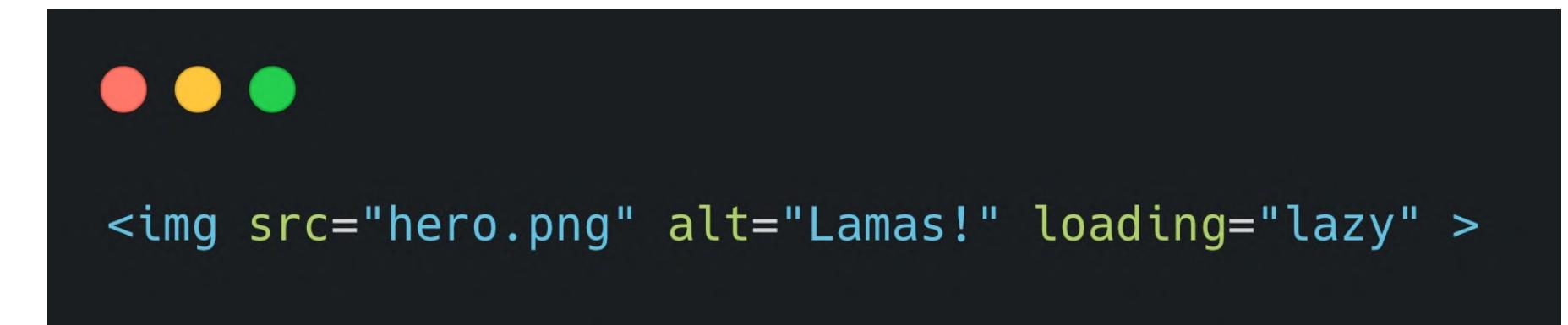


```
<iframe src="datawrapper.html" loading="lazy" >
```



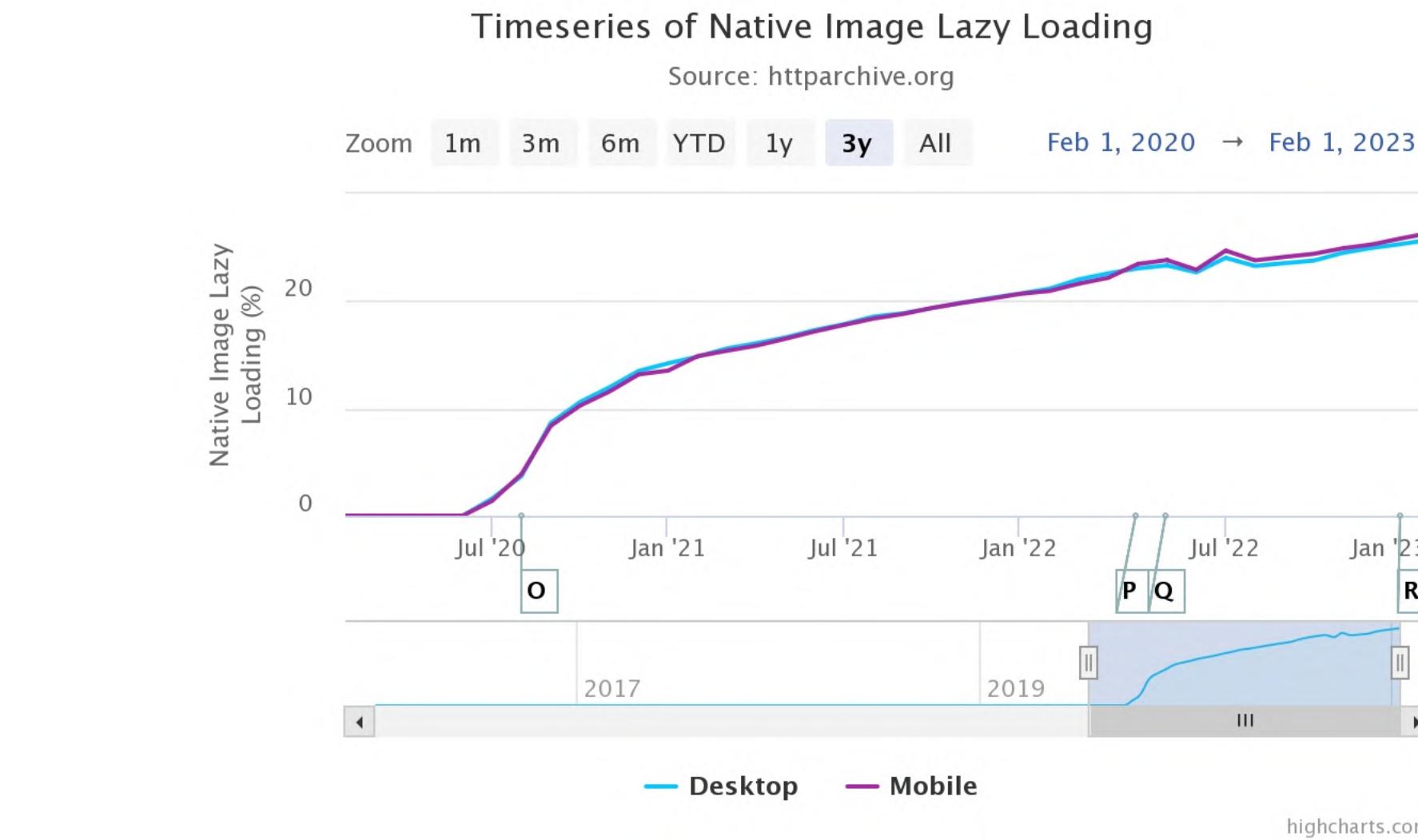
Lazy Loading nativ

Natives Lazyloading im Browser:



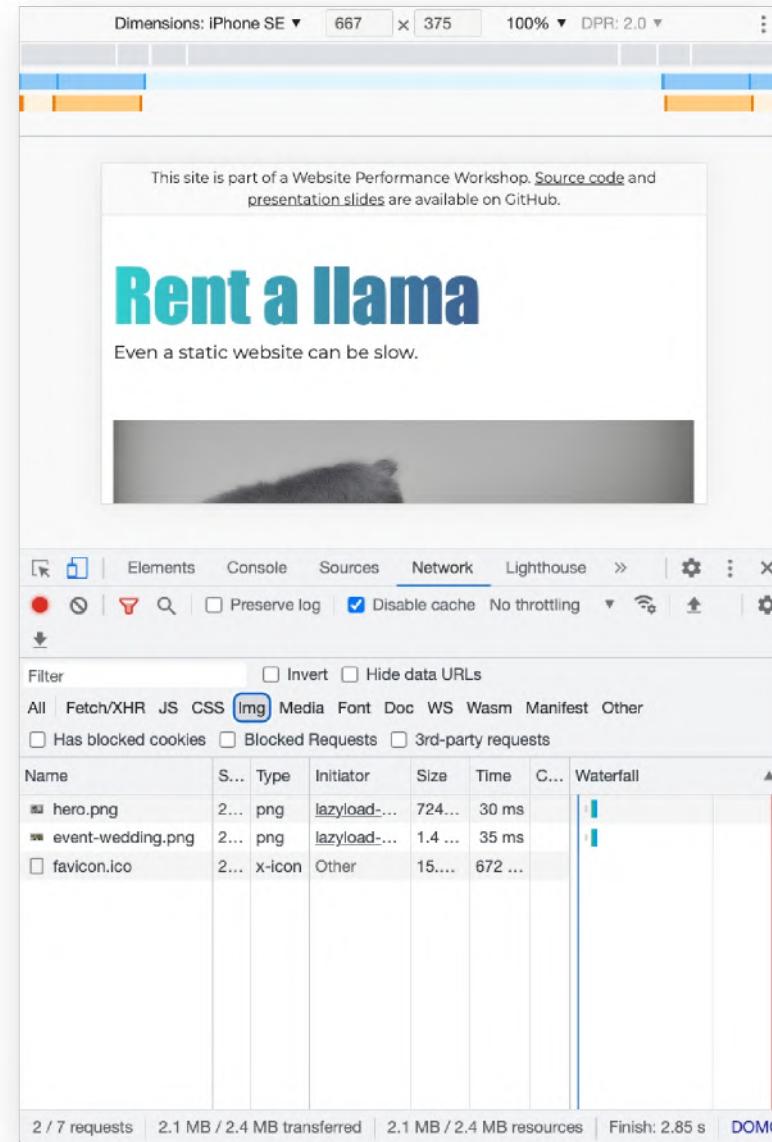
loading=lazy

Verbreitung: 25% der Seiten im Netz nutzen das loading=lazy Attribut an Bildern.

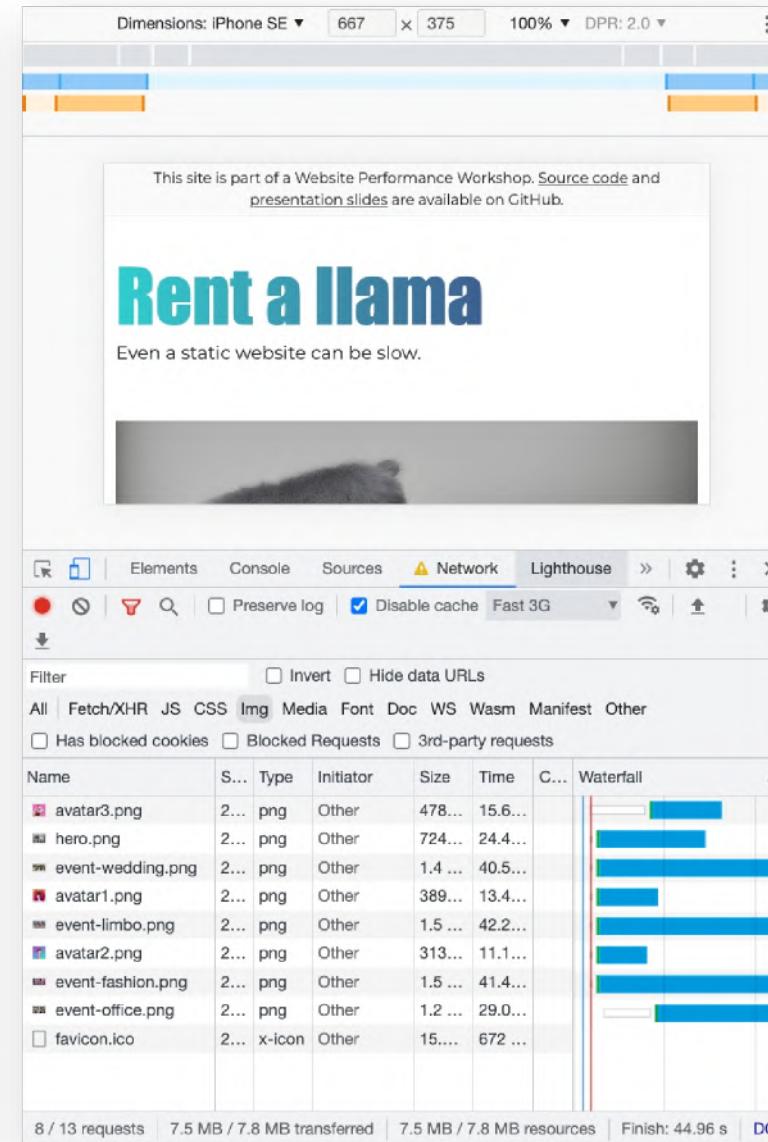


Credit: <https://httparchive.org/reports/state-of-images#imgLazy>.

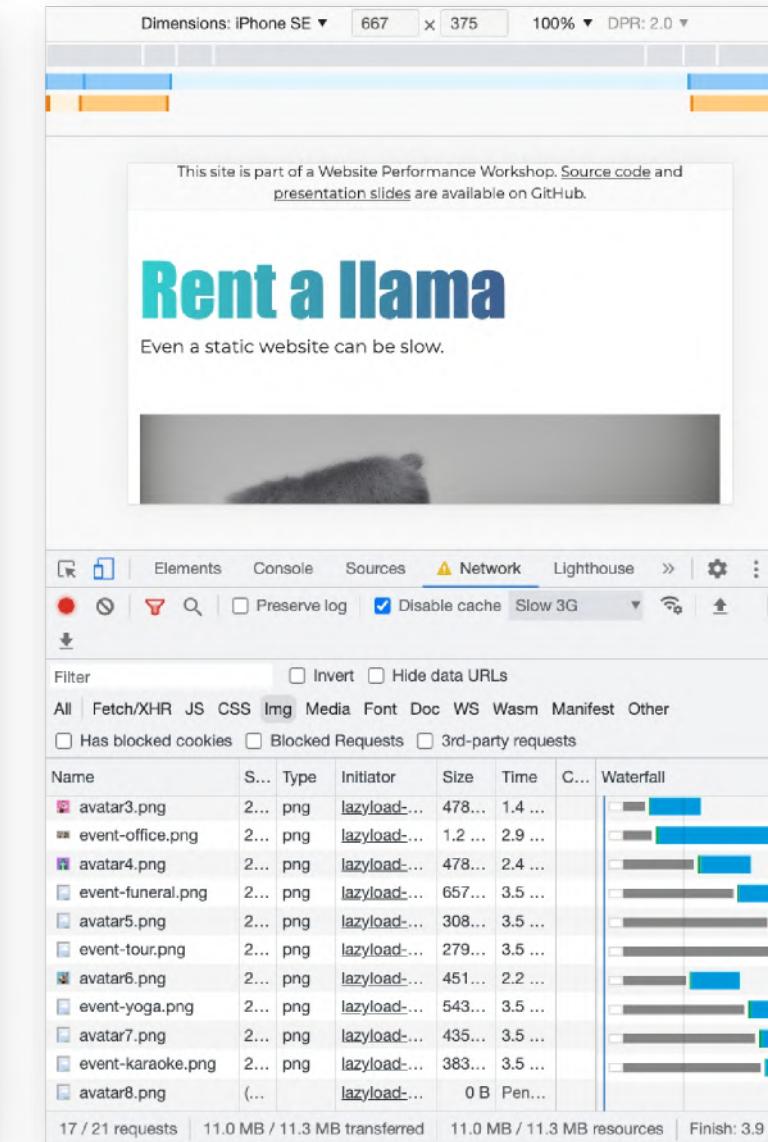
Lazy Loading native



kein Throttling: 2 Bilder

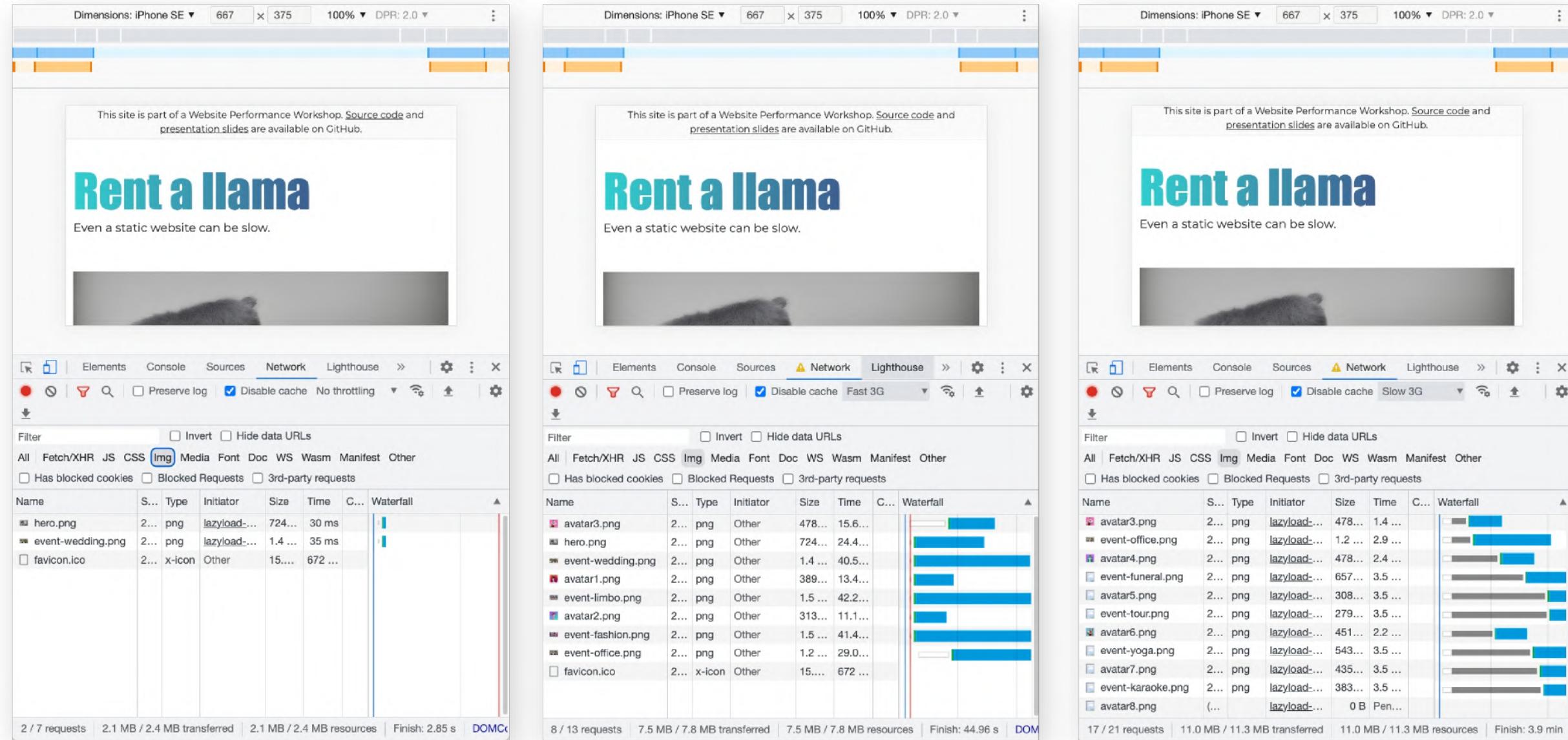


fast 3G: 7 Bilder



slow 3G: 16 Bilder

Lazy Loading nativ



kein Throttling: 2 Bilder

fast 3G: 7 Bilder

slow 3G: 16 Bilder

Mit `loading=lazy` übergibt man die Kontrolle an den Browser. Und der macht vielleicht Dinge, die man nicht möchte.

Zum Beispiel wird *mehr* vorgeladen, wenn die Internetverbindung langsam ist!

Optimize

Lazy Loading
Fassaden

Fassaden

QUIZ

Wissenstest des Tages

Von ZEIT ONLINE
12. Oktober 2023

SPIELEN

5/8

3 Punkte

Dieser Satz fiel nach der Landtagswahl in Bayern: "Ich würde der CSU empfehlen, jetzt nicht so mädchenhaft aufzutreten." Wer sagte ihn?

AfD-Politiker Martin Böhm

Freie-Wähler-Chef Hubert Aiwanger

Bayerns ehemaliger Ministerpräsident Horst Seehofer

☰

Quiz suchen

» Quiz spielen

📝 Quiz erstellen

⭐ Die besten Spieler

Die besten Quizautoren

Impressum

Fassaden



Bombenanschlag in Ankara

PKK soll sich zu Anschlag in Ankara bekannt haben

Recep Tayyip Erdogan bezeichnet die Explosion in Ankara als "letztes Zucken des Terrors". Einem Bericht zufolge soll die PKK für den Anschlag verantwortlich sein.

The image shows two overlapping web pages. On the left, a teal-colored page for 'Wortiger' features a cartoon tiger, four white boxes containing the letters 'W', 'O', 'R', and 'T', and a 'STARTEN' button. Below it, text reads: 'Das beliebte Worträtsel jetzt auch auf ZEIT ONLINE: Finden Sie in 6 Versuchen das richtige Wort.' On the right, a white page for 'Wissenstest des Tages' by ZEIT ONLINE from October 1, 2023, features the word 'QUIZ' and a large 'SPIELEN' button. At the bottom, a black bar contains the word 'Gesellschaft' and links to 'Letzte Generation', 'Rechtsextremismus', and 'Extremwerte'.

Australien

Behörden ordnen wegen Buschbränden Evakuierungen an



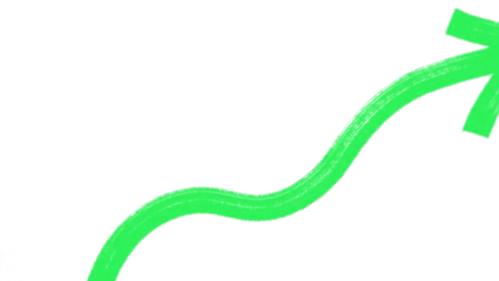
Fassaden



Bombenanschlag in Ankara

PKK soll sich zu Anschlag in Ankara bekannt haben

Recep Tayyip Erdogan bezeichnet die Explosion in Ankara als "letztes Zucken des Terrors". Einem Bericht zufolge soll die PKK für den Anschlag verantwortlich sein.



Host	Datei	Typ	Übertra...	Größe
quiz.z...	daily?embedded=true&fix=4	html	1,15 kB	846 B
quiz.z...	teaser.6aa74084.css	css	6,98 kB	39,34 kB

The interface for the 'Wortiger' word puzzle game. It features a teal header with a yellow tiger logo and the word 'WORT'. Below the header, the text 'Wortiger' is displayed in bold. A subtext reads: 'Das beliebte Worträtsel jetzt auch auf ZEIT ONLINE: Finden Sie in 6 Versuchen das richtige Wort.' A large 'STARTEN' button is at the bottom. To the right of the teal box is a white box containing a quiz.

The quiz interface titled 'Wissenstest des Tages' by ZEIT ONLINE, dated 01. Oktober 2023. It features a large 'SPIELEN' button. The entire white box containing the quiz is highlighted with a thick green border, matching the one on the adjacent teal box. A green arrow points from the top right of the teal box towards the top edge of this white box.

A dark banner at the bottom of the page with the word 'Gesellschaft' in white. To its right, smaller text reads 'Letzte Generation · Rechtsextremismus · Extremwerte'. A small white arrow points to the right at the end of the banner.

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Fassaden



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bekannt haben

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The screenshot shows a teal-colored quiz interface. At the top, there's a cartoon tiger holding four white boxes with the letters 'W', 'O', 'R', and 'T'. Below the tiger, the word 'Wortiger' is written in a bold, sans-serif font. Underneath, it says: 'Das beliebte Worträtsel jetzt auch auf ZEIT ONLINE: Finden Sie in 6 Versuchen das richtige Wort.' A large dark button labeled 'STARTEN' is centered below this text. At the bottom of the teal section, there's a black bar with the word 'Gesellschaft' and some small text about the last generation, right-wing extremism, and far-right movements.

The screenshot shows a news article from Zeit Online. At the top left is a photo of a police officer. The main headline reads: 'PKK soll sich zu Anschlag in Ankara bekannt haben'. Below the headline is a paragraph of text. On the right side of the article, there's a sidebar with three options: 'AfD-Politiker Martin Böhm', 'Freie-Wähler-Chef Hubert Aiwanger', and 'Bayerns ehemaliger Ministerpräsident Horst Seehofer'. A green arrow points upwards from the bottom of the teal 'Wortiger' box towards the top of this news article.

Host	Datei	Typ	Übertra...	Größe
quiz.z...	daily?embedded=true&fix=4	html	1,15 kB	846 B
quiz.z...	teaser.6aa74084.css	css	6,98 kB	39,34 kB



Host	Datei	Typ	Übertra...	Größe
quiz.z...	daily?embedded=true&fix=4	html	1,15 kB	846 B
quiz.z...	teaser.6aa74084.css	css	6,98 kB	39,34 kB
quiz.z...	/	html	1,69 kB	1,73 kB
quiz.z...	quiz.d16f76ce.css	css	24,40 kB	131,03 kB
quiz.z...	modernizr.c2ed6eb5.js	js	3,08 kB	4,98 kB
quiz.z...	quiz.d0c7b3f4.js	js	146,76 kB	447,48 kB
respo...	981949533494636?url=https:	js	7,60 kB	26,53 kB
quiz.z...	/-/	json	590 B	356 B
quiz.z...	daily	json	4,98 kB	4,74 kB
quiz.z...	rad-grad.ded4378d.png	png	35,39 kB	34,63 kB
audev....	wt?p=453,redaktion.homepage.gif	gif	782 B	43 B



Australien
Behörden ordnen wegen Buschbränden
Evakuierungen an

Fassaden



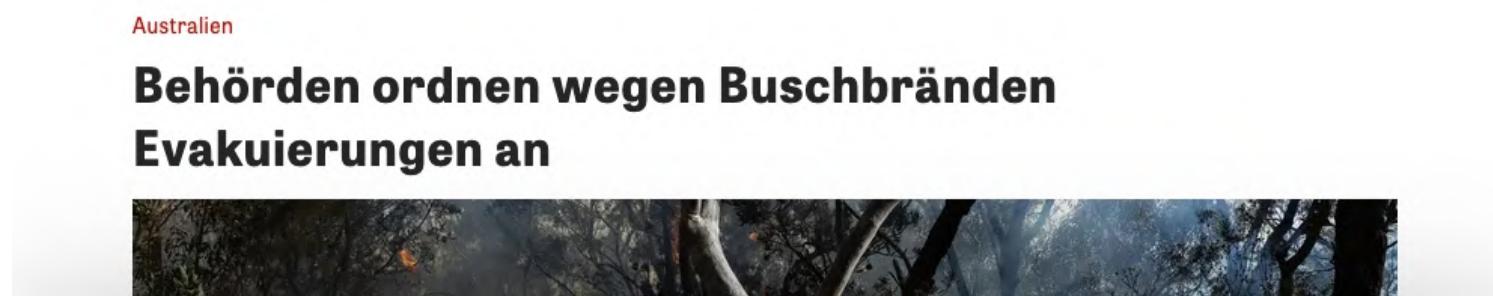
Bombenanschlag in Ankara

PKK soll sich zu Anschlag in Ankara bekannt haben

Recep Tayyip Erdogan bezeichnet die Explosion in Ankara als "letztes Zucken des Terrors". Einem Bericht zufolge soll die PKK für den Anschlag verantwortlich sein.

The image contains two screenshots of mobile interfaces. The left screenshot shows a word puzzle game with a yellow tiger logo and a 'STARTEN' button. The right screenshot shows a quiz titled 'Wissenstest des Tages' from Zeit Online, dated 01. Oktober 2023, with a 'SPIELEN' button. A green brushstroke graphic is overlaid on both screens, connecting them.

- Videos (youtube/vimeo-lite)
- Social Media Widgets
- Chats, Support-Messenger
- Spiele, Interaktives
- Dashboards in Apps
- Formular-Logik



Australien

Behörden ordnen wegen Buschbränden Evakuierungen an



Optimize

Lazy Loading

Fassaden

Font Loading

Google Fonts



```
/* styles.css */  
  
@import url('https://fonts.googleapis.com/css2?family=Montserrat');  
  
h1 { font-family: 'Montserrat'; }
```

Name	Status	Type	Initiator	Size	Time	Cach...	Waterfall
normalize.css	200	stylesheet	index.html	6.3 kB	798 ms		
styles-large.css	200	stylesheet	index.html	225 kB	7.71 s		
css2?family=Montserrat&display=block	200	stylesheet	styles-large.css	550 B	606 ms	privat...	
JTUhJlg1_i6t8kCHKm4532VJOt5-QN...	200	font	css2?family=Monts...	12.7 kB	1.09 s	publi...	

Google Fonts



```
/* index.html */

<head>
<link href="styles.css" rel="stylesheet">
<link href="https://fonts.googleapis.com/css2?family=Montserrat" rel="stylesheet">

/* styles.css */

h1 { font-family: 'Montserrat'; }
```

Name	Status	Type	Initiator	Size	Time	Cach...	Waterfall
css2?family=Montserrat&display=block	200	stylesheet	index.html	550 B	600 ms	private...	
normalize.css	200	stylesheet	index.html	6.3 kB	785 ms		
styles-large.css	200	stylesheet	index.html	225 kB	7.70 s		
JTUhJlg1_i6t8kCHKm4532VJOt5-QN...	200	font	css2?family=Monts...	12.7 kB	1.01 s	public...	
favicon.ico	200	x-icon	Other	15.3 kB	672 ms		

Selfhosted Fonts

```
/* index.html */

<head>
  <link href="/fonts/Montserrat-Regular.woff2"
        rel="preload" as="font" crossorigin>
  <link href="styles.css" rel="stylesheet">

/* styles.css */

@font-face {
  font-family: 'Montserrat';
  font-style: normal;
  font-weight: 400;
  font-display: block;
  src: url('/fonts/Montserrat-Regular.woff2')
       format('woff2');
}
h1 { font-family: 'Montserrat'; }
```

Name	Status	Type	Initiator	Size	Time	Cach...	Waterfall
 Montserrat-Regular.woff2	200	font	index.html	61.5 kB	2.49 s		
 normalize.css	200	stylesheet	index.html	6.3 kB	784 ms		
 styles-large.css	200	stylesheet	index.html	225 kB	7.59 s		

Optimize

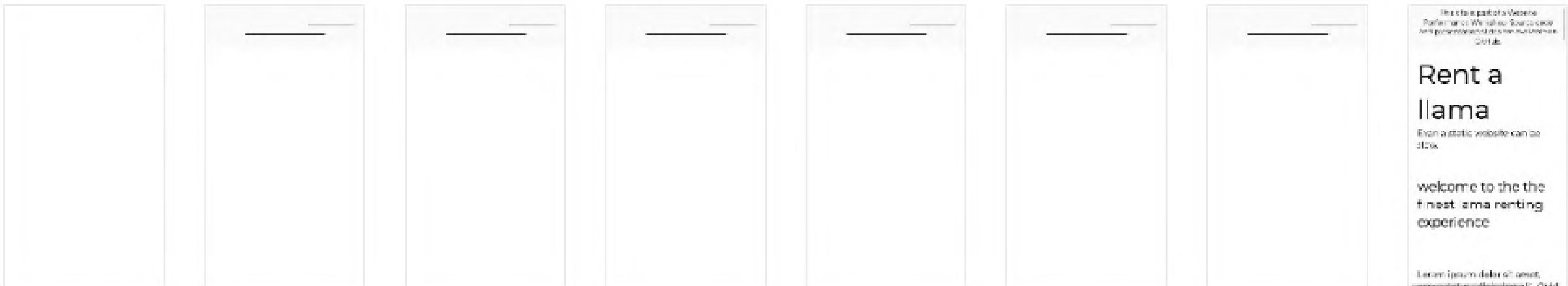
Lazy Loading

Fassaden

Font Loading

Font Display

... und während dem Laden der Webfonts?

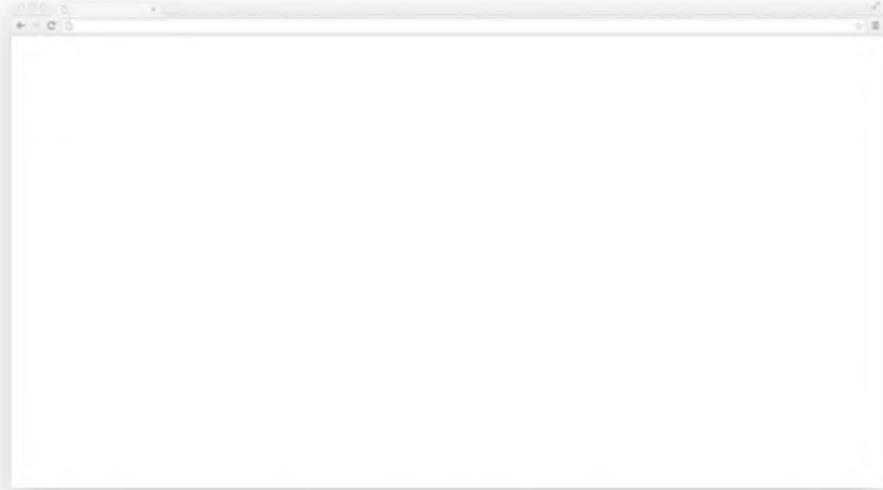


... und während dem Laden der Webfonts?



Credit: Zach Leatherman: [The Mitt Romney webfont problem](#)

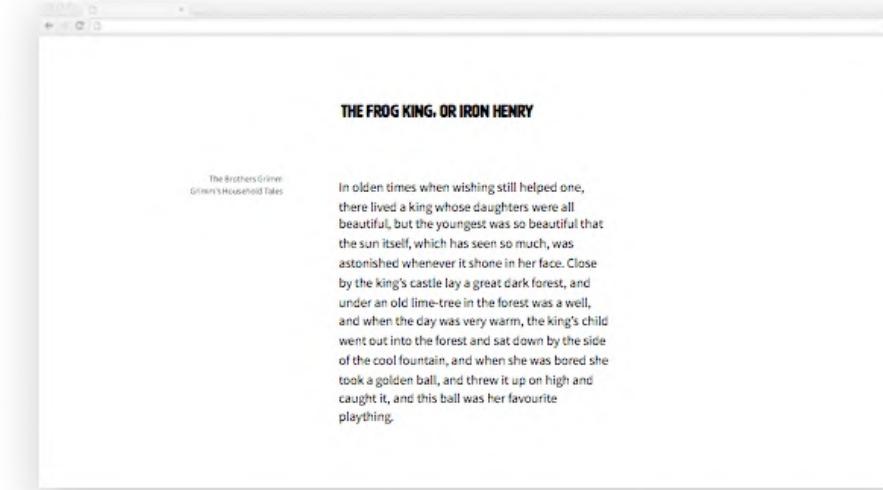
Flash Of Unstyled Text (FOUT)



request content



content loads

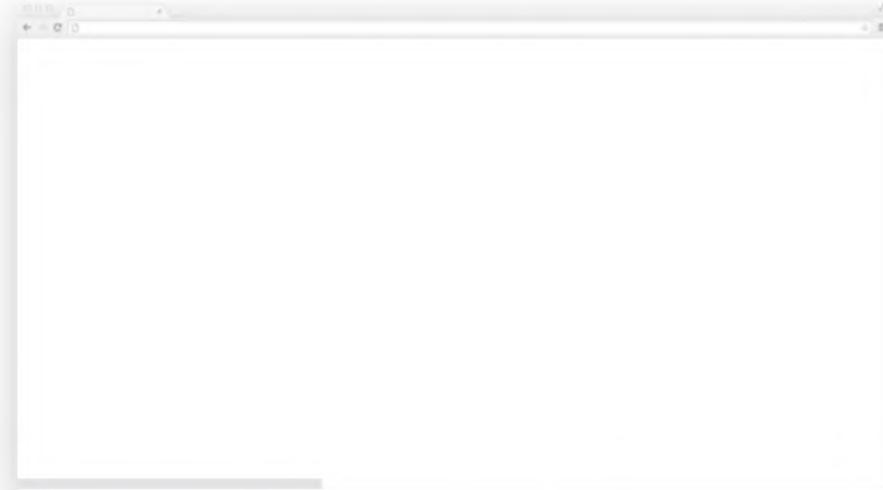


web fonts load

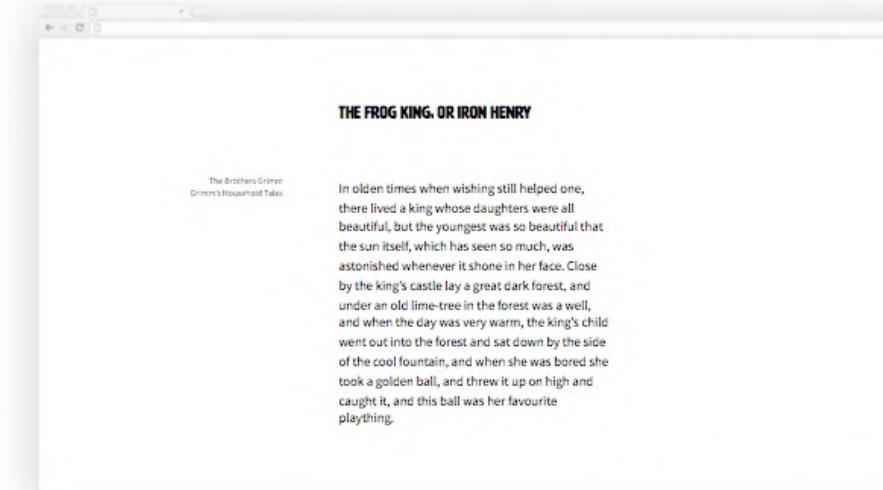
Flash Of Invisible Text (FOIT)



request content



content loads



web fonts load

font-display

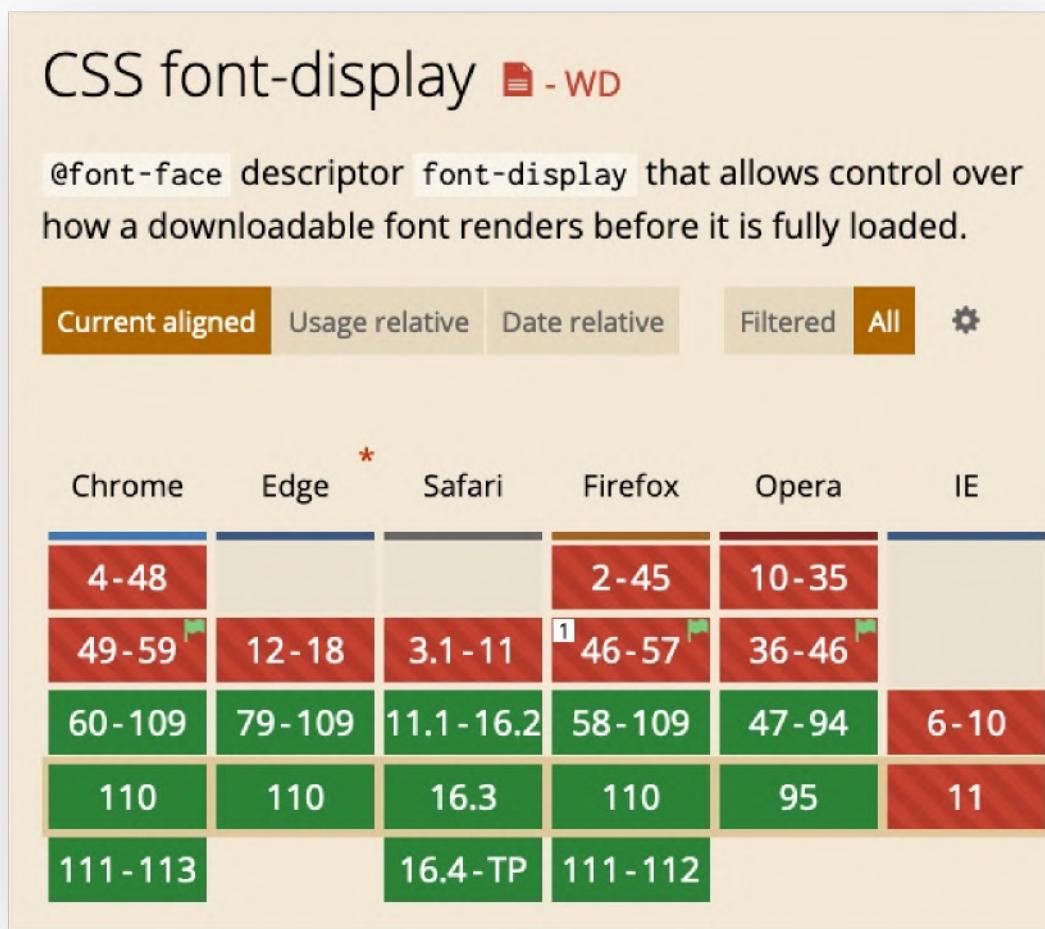
Die **font-display** CSS-Property an @font-face Definitionen gibt dem Browser die Ladestrategie für Webfonts vor.



```
@font-face {  
    font-family: 'MyWebFont';  
    src: url('myfont.woff2') format('woff2');  
    font-display: [auto|block|swap|fallback|optional];  
}
```

font-display

Die font-display CSS-Property an @font-face Definitionen gibt dem Browser die Ladestrategie für Webfonts vor.



```
@font-face {  
    font-family: 'MyWebFont';  
    src: url('myfont.woff2') format('woff2');  
    font-display: [auto|block|swap|fallback|optional];  
}
```

font-display

`font-display: block;`

block

Platz wird freigehalten,
bis die Webfont
geladen ist.

FOIT

(flash of invisible text)

`font-display: swap;`

swap

System-Font wird
angezeigt, bis die
Webfont geladen ist.

FOUT

(flash of unstyled text)

`font-display: fallback;`

fallback

Platz wird kurz freigehalten,
dann wird Systemfont
gezeigt, dann die Webfont
(wenn binnen 3s geladen).

Beim nächsten Seitenaufruf
ist die Schrift dann da.

`font-display: optional;`

optional

Wie Fallback, aber der
Browser darf die Webfont
auch weglassen bei
langsamem Verbindungen.

Beim nächsten Seitenaufruf
ist die Schrift dann da.

auto ist der Browser-Default, und das ist in der Regel **swap/fallback**. **Swap** wird auch von Google Fonts mitgegeben.

Optimize

Lazy Loading

Fassaden

Font Loading

Font Display

Rel=preload

Hero-Image

This site is part of a Website Performance Workshop. [Source code](#) and [presentation slides](#) are available on GitHub.

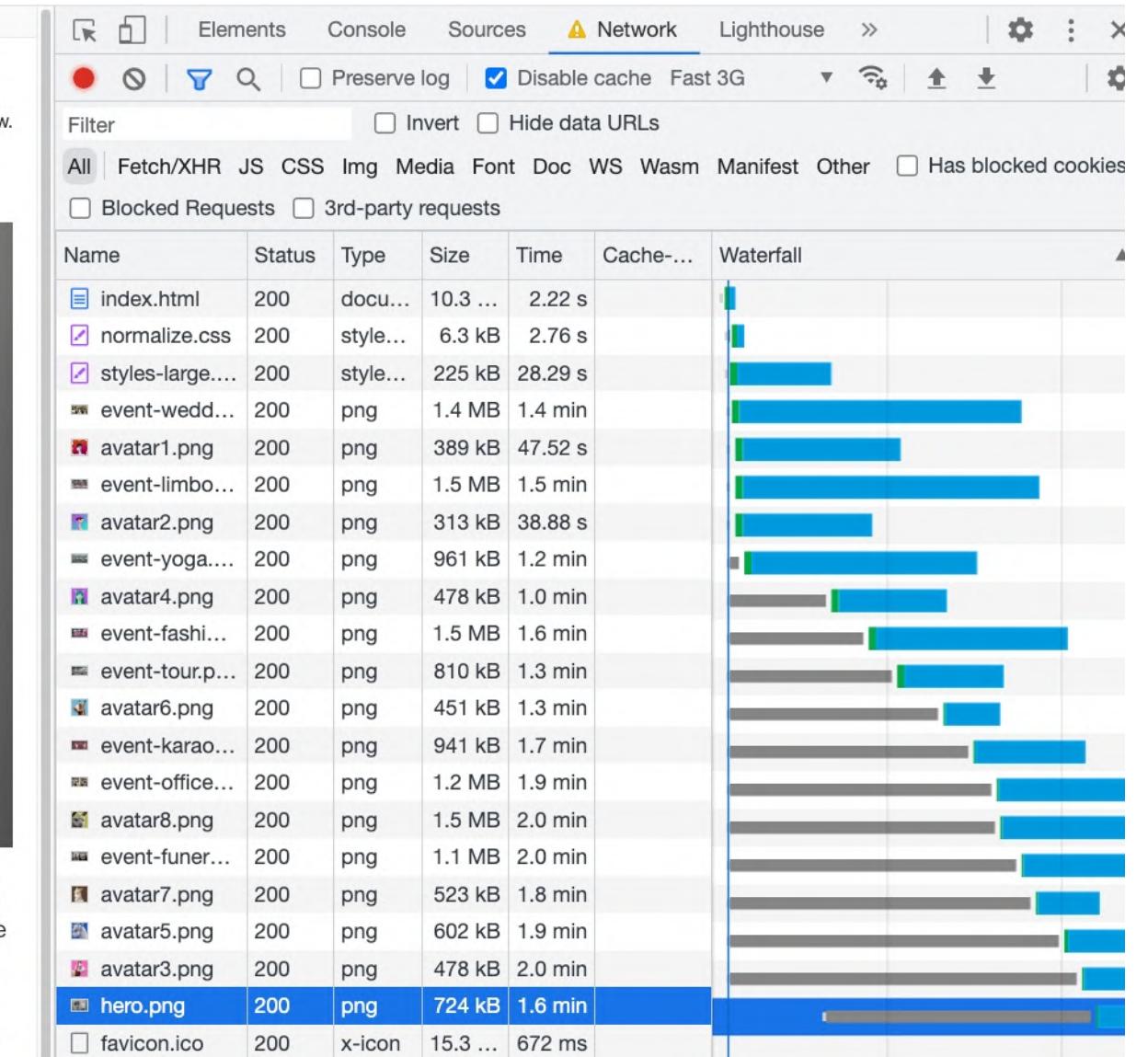
Rent a Llama

Even a static website can be slow.



**Willkommen beim
professionellen Lamaverleih**

Ob für Firmenevents, Hochzeiten, Geburtstagsfeiern oder Naturausflüge - unsere Lamas sind die perfekte Ergänzung und garantieren Ihnen und Ihren Gästen ein besonderes Erlebnis. Unsere Lamas sind gut ausgebildet und bestens gepflegt. Wir stellen sicher,

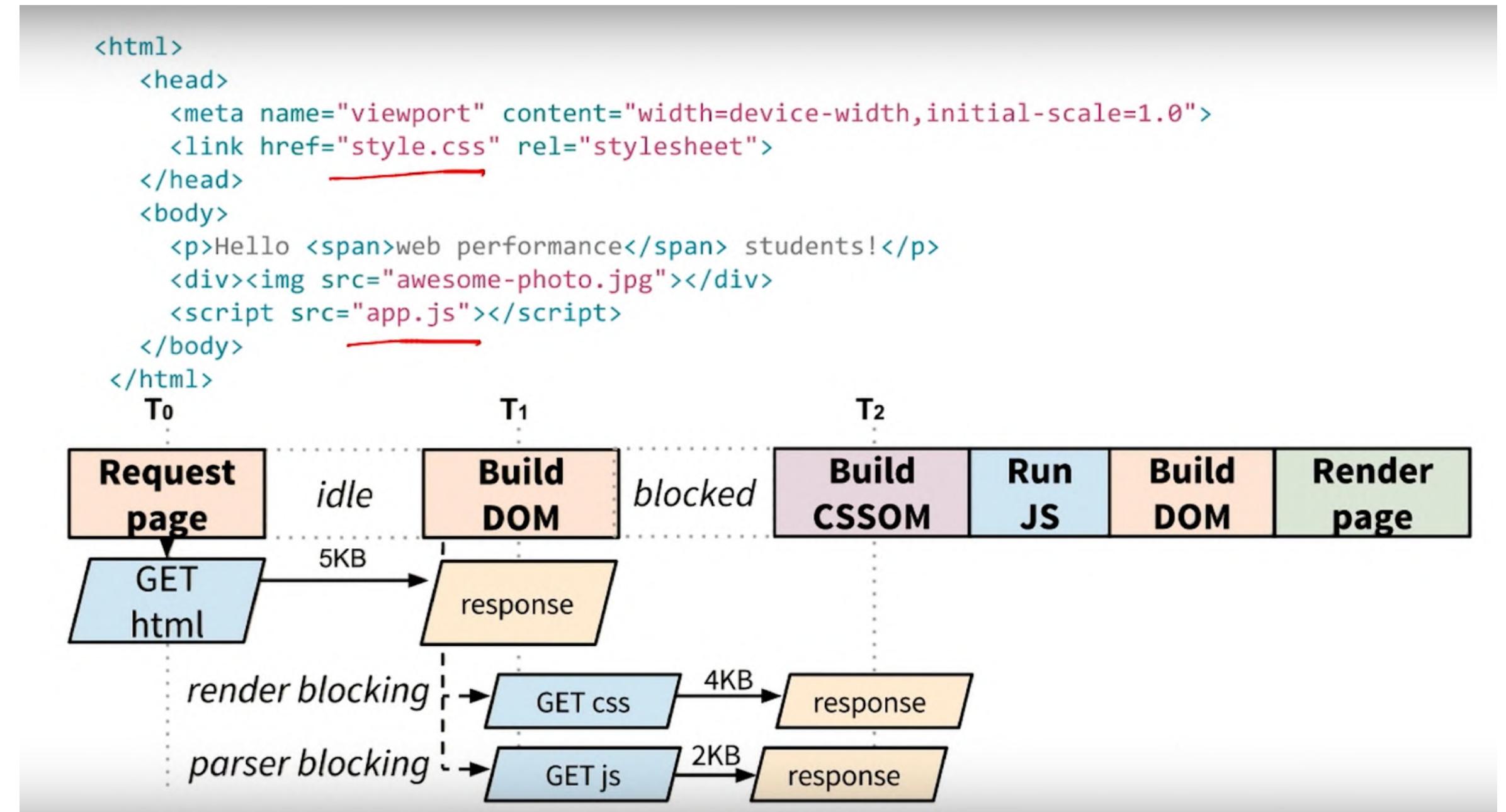


Name	Status
index.html	200
normalize.css	200
styles-large.css	200
event-wedding.png	200
avatar1.png	200
event-limbo.png	200
avatar2.png	200
event-yoga.png	200
avatar4.png	200
event-fashion.png	200
event-tour.png	200
avatar6.png	200
event-karaoke.png	200
event-office.png	200
avatar8.png	200
event-funeral.png	200
avatar7.png	200
avatar5.png	200
avatar3.png	200
hero.png	200
favicon.ico	200

Name	Status	Type	Initiator
index.html	200	document	Other
normalize.css	200	stylesheet	index.html
styles-large.css	200	stylesheet	index.html
event-wedding.png	200	png	index.html
avatar1.png	200	png	index.html
event-limbo.png	200	png	index.html
avatar2.png	200	png	index.html
event-yoga.png	200	png	index.html
avatar4.png	200	png	index.html
event-fashion.png	200	png	index.html
event-tour.png	200	png	index.html
avatar6.png	200	png	index.html
event-karaoke.png	200	png	index.html
event-office.png	200	png	index.html
avatar8.png	200	png	index.html
event-funeral.png	200	png	index.html
avatar7.png	200	png	index.html
avatar5.png	200	png	index.html
avatar3.png	200	png	index.html
hero.png	200	png	styles-large.css
favicon.ico	200	x-icon	Other

Die Spalten im Netzwerk-Tab der Developer Tools lassen sich anpassen.
So kann man zum Beispiel den Initiator von Requests anzeigen.

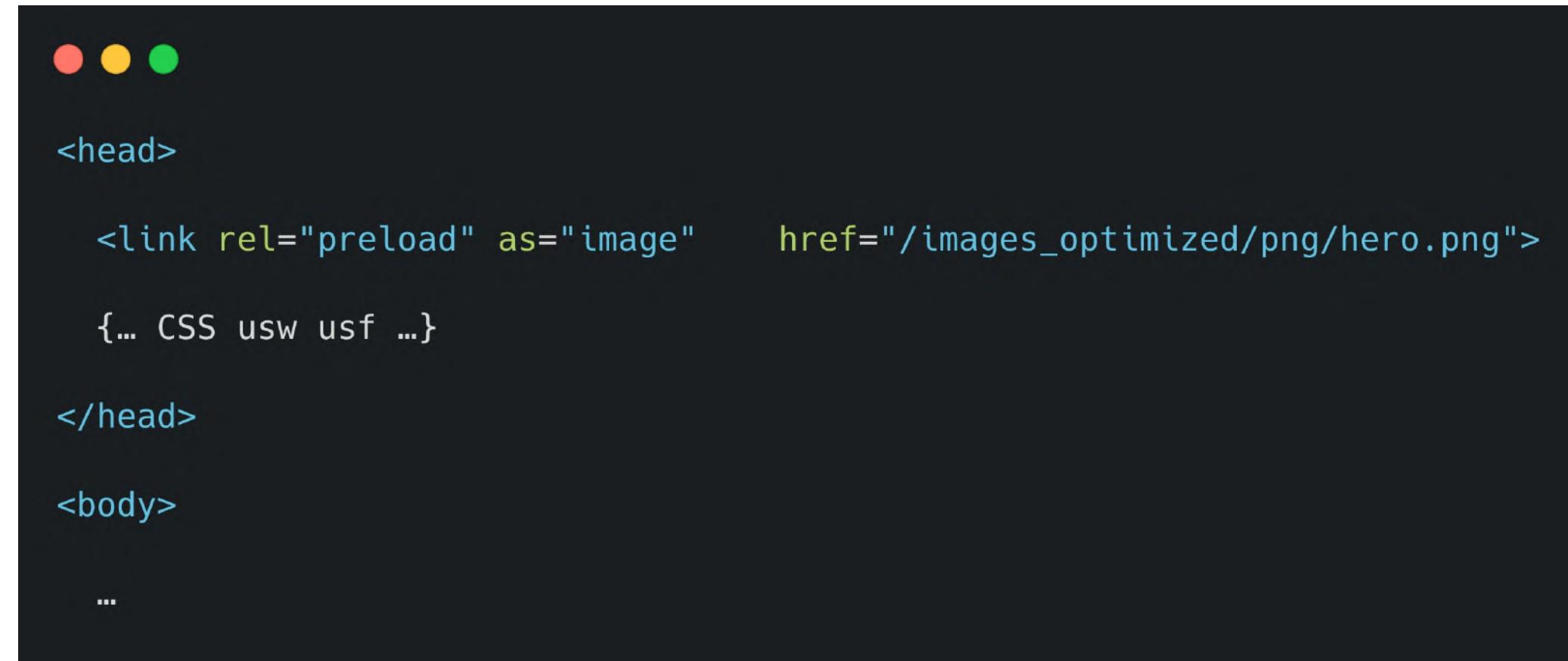
Critical Rendering Path im Browser



Credit: <https://www.youtube.com/watch?v=ufCVTowBxoY>

Preload

Mit Preload-Links können wir im Head einer HTML-Seite dem Browser schon Hinweise geben auf Ressourcen, die während dem Rendern gebraucht werden.



The screenshot shows a dark-themed code editor window. In the top-left corner, there are three small colored circles: red, yellow, and green. The main area contains the following HTML code:

```
<head>
  <link rel="preload" as="image" href="/images_optimized/png/hero.png">
  {... CSS usw usf ...}
</head>
<body>
  ...
</body>
```

Unterstützt werden nicht nur Bilder, sondern auch Videos, JS Dateien, CSS Dateien.

Hero-Image mit rel=preload

This site is part of a Website Performance Workshop. [Source code](#) and [presentation slides](#) are available on GitHub.

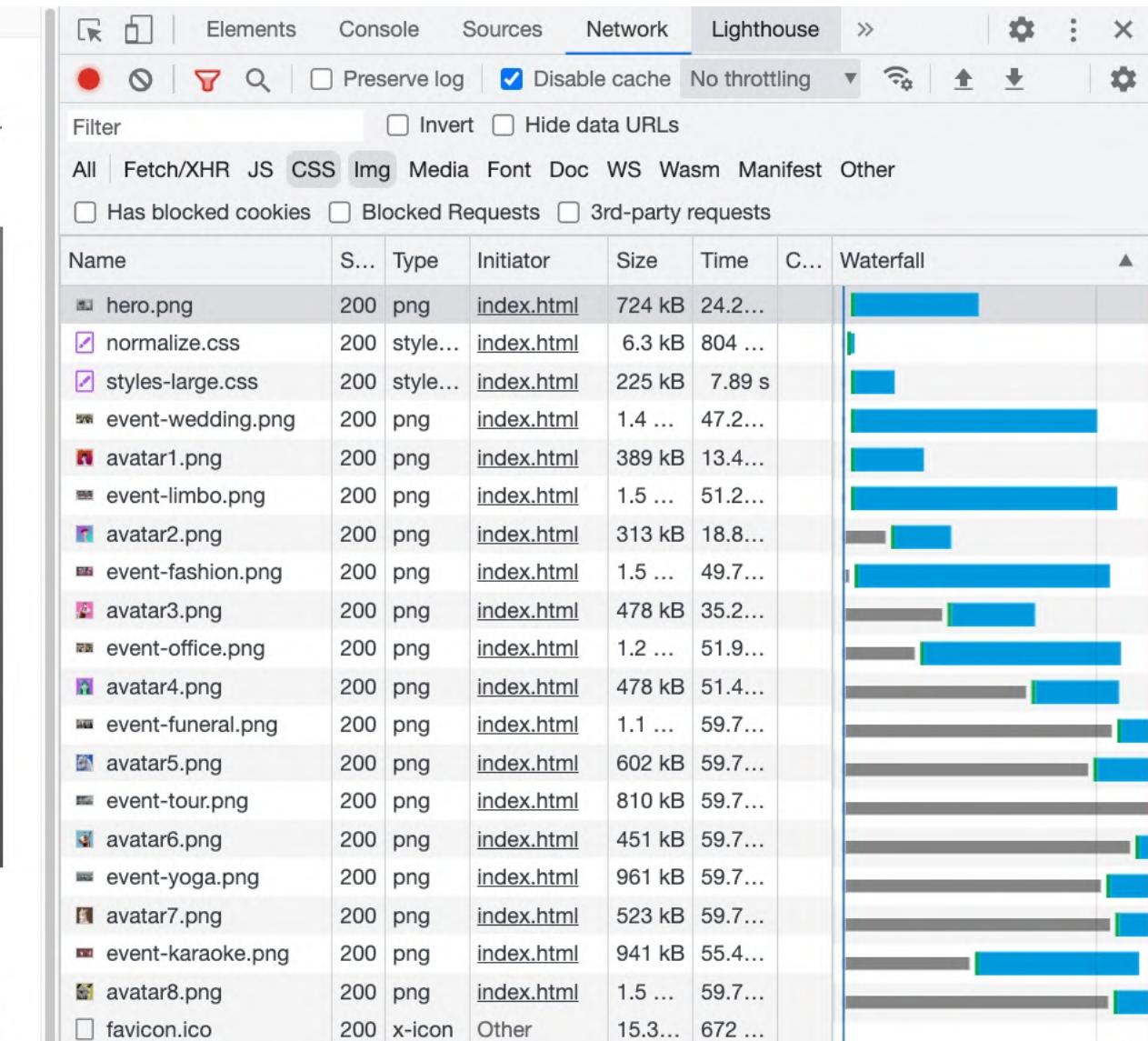
Rent a llama

Even a static website can be slow.

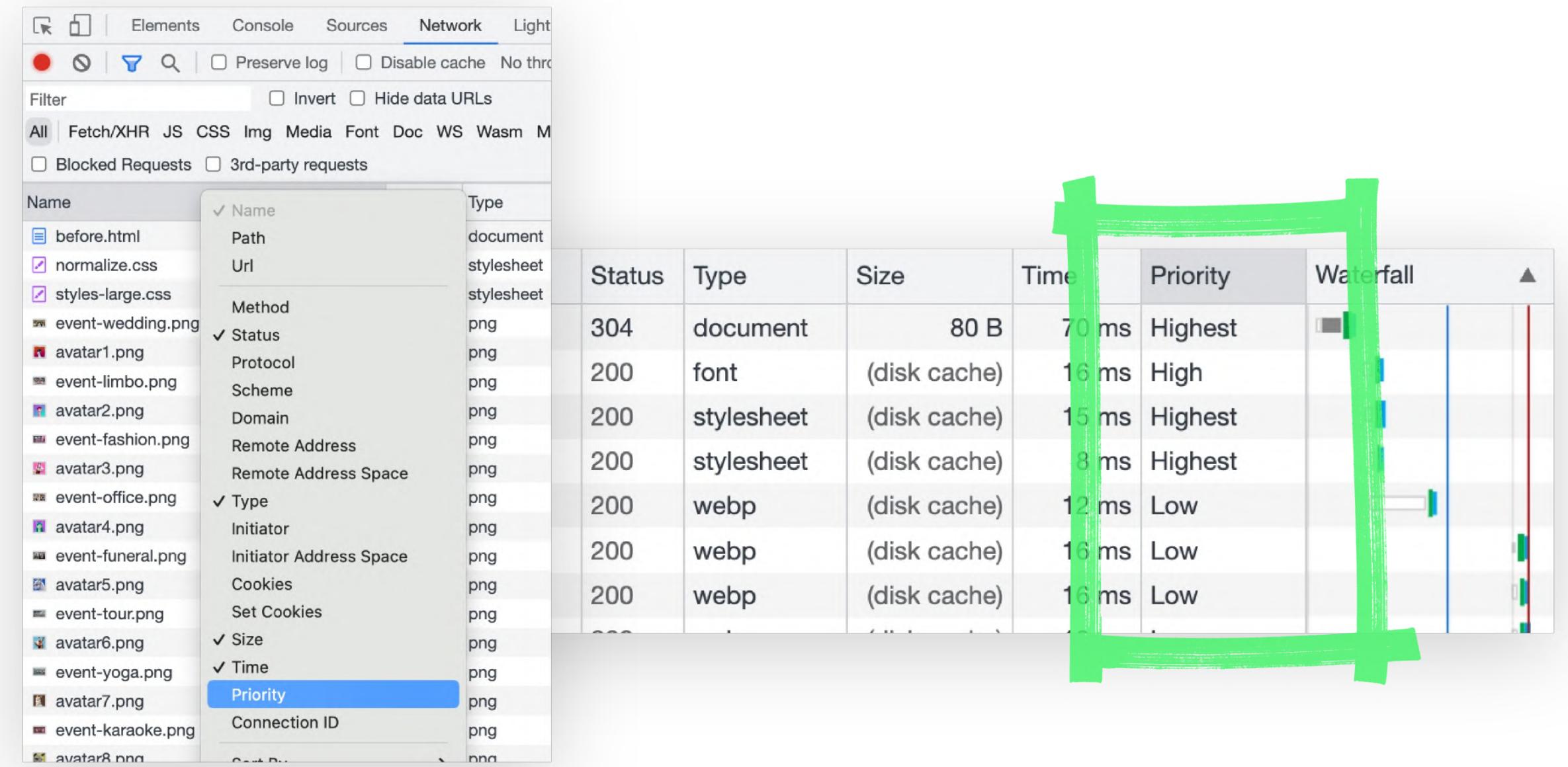


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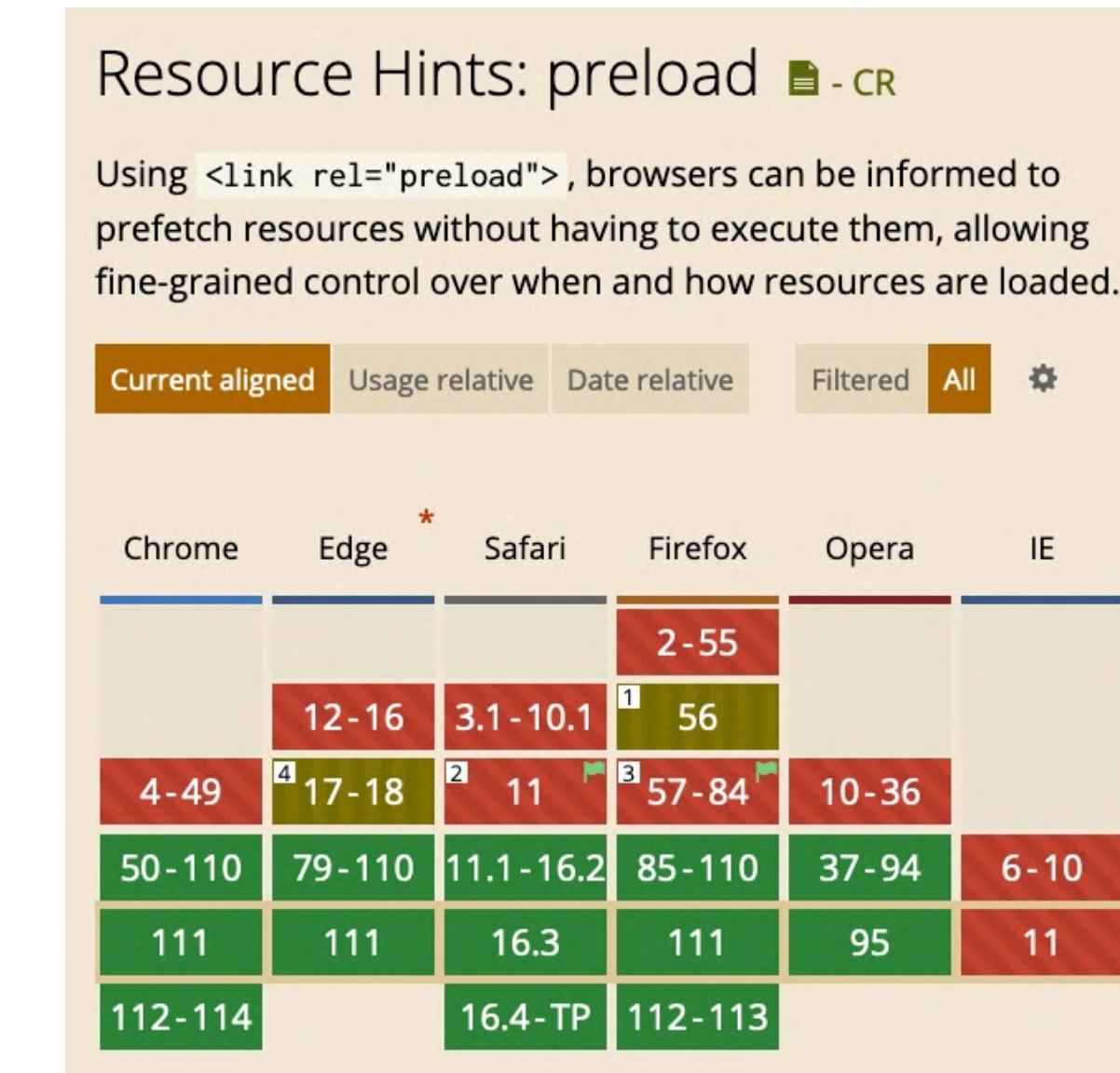


Developer Tools: Resource Priority



Im Netzwerk-Tab kann man mit der rechten Maustaste die dargestellten Spalten umstellen. Eine davon ist die Priority. Sie zeigt an, ob der Browser dieselbe Vorstellung von Resource Priority hat wie ihr.-

rel=preload Browser Support



rel=preload und Media Queries, Retina

```
● ● ●

<link rel="preload" as="image"
      href="hero-narrow.png" media="(max-width: 600px)" >

<link rel="preload" as="image"
      href="/images/hero-huge_2x.png" media="(min-width: 900px) and (-webkit-min-device-pixel-ratio: 2)">

<link rel="preload" as="image"
      href="hero.jpg" imagesrcset="hero_800px.jpg 800w, hero_1600px.jpg 1600w" imagesizes="50vw">

<link rel="preload" as="image"
      imagesrcset="hero.png 1x, hero-2x.png 2x">
```

Prefetch

Während **Preload** Ressourcen auf der aktuellen Seite priorisiert, können mit **Prefetch** Inhalte vorgeladen werden, die auf späteren Seiten benötigt werden.



```
<link rel="prefetch" as="image"
      href="/images/checkout-hero.jpg" />

<link rel="prefetch" as="document"
      href="next-step.html" />
```

Das funktioniert für HTML-Seiten Bilder, Videos, Styles, JS.

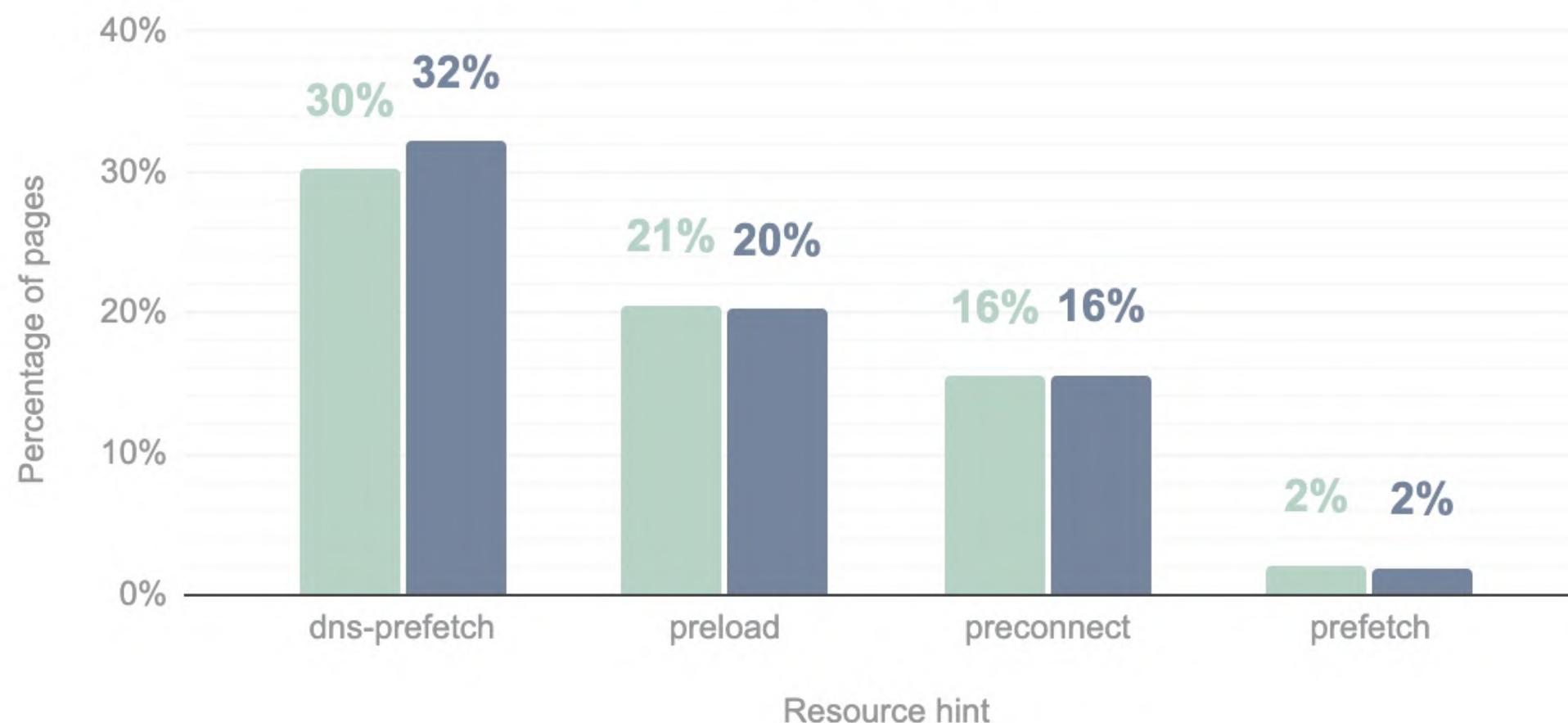
Es verbraucht Traffic, sollte also bewusst und gezielt eingesetzt werden. User können es in den Browser-Settings unterbinden.

"Quicklink" und "Guess" sind JavaScript Bibliotheken, die das Prefetchen automatisieren.

Fonts resource hints usage

Web Almanac 2022: Fonts

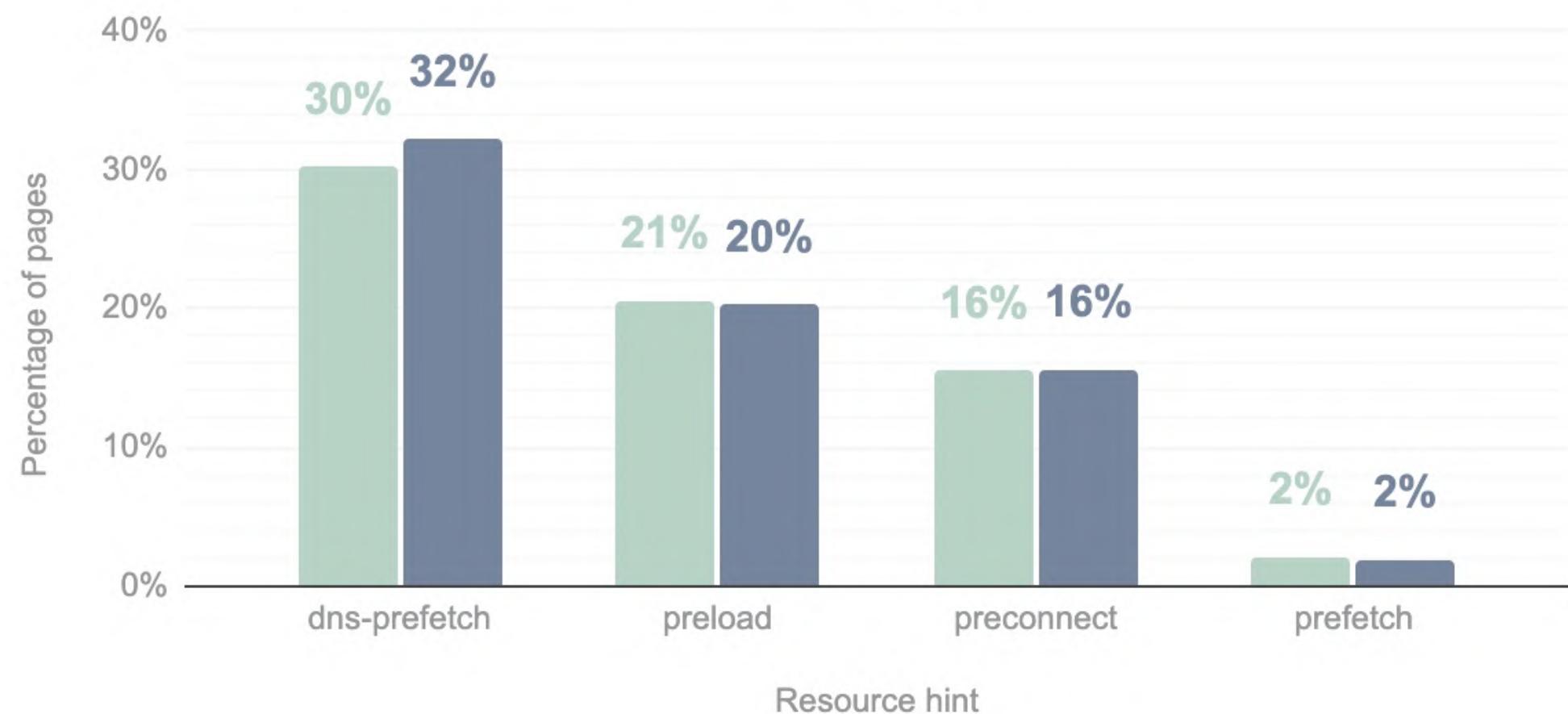
desktop mobile



Fonts resource hints usage

Web Almanac 2022: Fonts

desktop mobile



Webfonts

Loading und Display

- Wann werden die Webfonts geladen?
- Wie werden die Webfonts geladen?
- Wie ist der Unterschied mit
`rel=preload` und `font-display:optional`?

hands-on

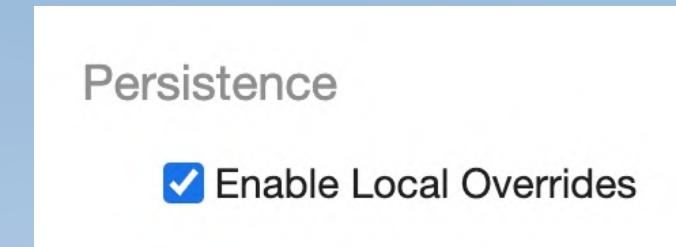


Credit: Pitch Sticker "Cyberpunk"

Exkurs

Local Overrides in den Chrome DevTools

- → Settings
 - → Enable Local Overrides
 - (Permissions)
- Inspect Tab
 - → CSS Source
 - → ändern und speichern
 - (HTML und JS ebenso)



A screenshot of the Chrome DevTools Sources tab. It shows a CSS rule for the 'body' element with the following code:

```
Inherited from body
body {
  font-family: 'MontserratLocal', sans-serif;
  font-family: 'MontserratLocal', sans-serif;
  font-family: "MySlowWebfont", sans-serif;
}
```

The file 'styles-large.css:47' is circled in green at the top right of the code block.

A screenshot of the Chrome DevTools Sources tab. It shows a list of files under 'Overrides'. The file 'styles-large.css' is selected and highlighted in blue. The code editor on the right shows the contents of this file:

```
* {
  box-sizing: border-box;
}

html {
  font-size: 1.25rem;
  line-height: 1.35;
}

body {
  /* TODO: Genutzte Webfont ändern */
  font-family: 'MontserratLocal', sans-serif;
  /*font-family: "MySlowWebfont", sans-serif;*/
}

h1,
h2.
```



Webfonts

Loading und Display

- Wann werden die Webfonts geladen?
- Wie werden die Webfonts geladen?
- Wie ist der Unterschied mit
`rel=preload` und `font-display:optional`?

hands-on



Credit: Pitch Sticker "Cyberpunk"

Optimize

Lazy Loading

Fassaden

Font Loading

Font Display

Rel=Preload

Layout Shift

Layout-Shift

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Even a static website can be slow.



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Wir haben das perfekte Lama für jede Gelegenheit!



Luxus-Lamas für Ihre Hochzeitsfotos

Sagt 'Ja' zu einem einzigartigen und unvergesslichen Hochzeits-Fotoshooting mit unseren liebenswerten Lamas! Unsere flauschigen Freunde werden einen Hauch von Verspieltheit und Charme zu Eurem besonderen Tag hinzufügen und Eure Fotos zu etwas Besonderem machen. Egal, ob Ihr einen romantischen Moment mit Eurem Partner einfangen möchtet oder Eure Brautjungfern für ein lustiges und festliches Gruppenfoto versammeln wollt - unsere Lamas werden sicherlich jedem ein Lächeln ins Gesicht zaubern.



[Barack O'Llama](#)

Limbo mit Lamas

Machen Sie sich bereit, sich mit unserem Lama-Limbo-Wettbewerb zu biegen und zu groovn! Seien Sie dabei bei einem Tag voller Spaß und freundlichem Wettbewerb, während Sie unsere liebenswerten Lamas unter der Stange Limbo tanzen sehen. Testen Sie Ihre Flexibilität und sehen Sie, wie tief Sie in diesem einzigartigen Twist eines klassischen Spiels gehen können. Bringen Sie Ihre Freunde, Familie und petzigen Begleiter mit, um das Fest zu genießen und Erinnerungen zu schaffen, die ein Leben lang halten werden.



[Llamanade](#)



Modenschau mit Pelz – aber anders

Rufen Sie die Paparazzi an und staunen Sie über die neuesten Modetrends - bei unserer Modenschau mit Lamas! Unsere stilvollen und trendbewussten Lamas

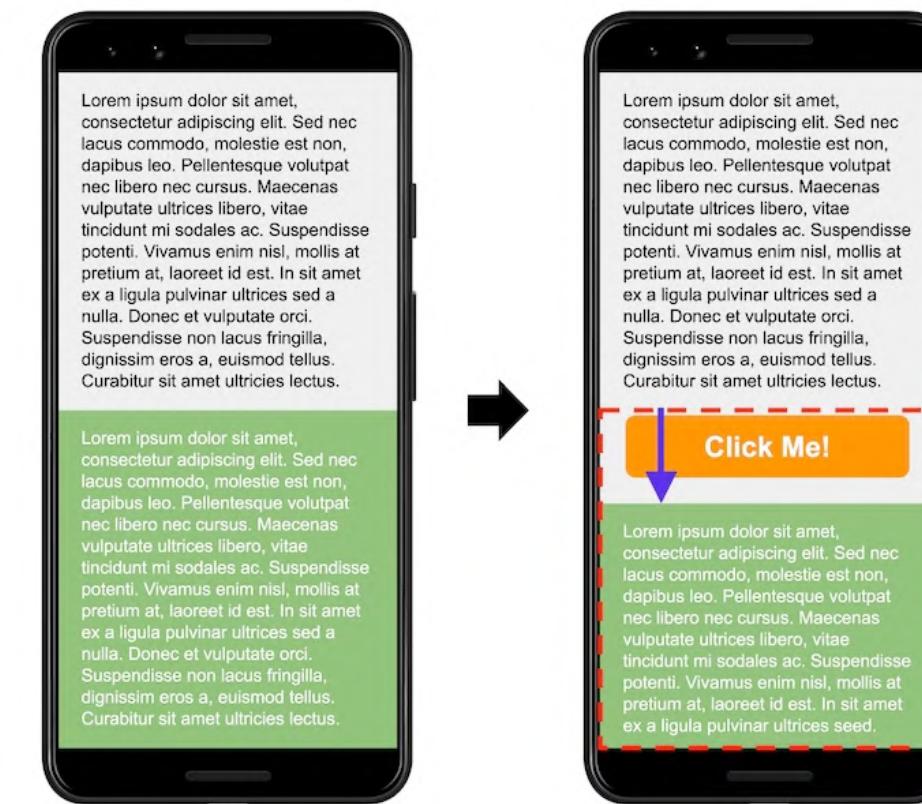


Firmen-Events

Boosten Sie die Motivation und Kreativität Ihres Teams mit unserem einzigartigen Büro-Event - mit Lamas! Von Brainstorming-Sessions über Teambuilding-

Cumulative Layout Shift

Der Cumulative Layout Shift (CLS) ist eine Maßeinheit für unerwartetes Verschieben des Layouts einer Website.



CLS ist einer der Core Web Vitals von Google und fließt mit in das Google-Ranking ein!

Cumulative Layout Shift

Performance studies related to “core web vitals”



Carpe improved Largest Contentful Paint by 52% and Cumulative Layout Shift by 41% and saw a 10% increase in traffic, a 5% increase in online store conversion rate, and a 15% increase in revenue.

[PERMALINK](#) [SHARE ON TWITTER](#)

#bounce rate #conversion rate #traffic #revenue #2023 #core web vitals

Cumulative Layout Shift

Performance studies related to “core web vitals”



Carpe improved Largest Contentful Paint by 52% and Cumulative Layout Shift by 41% and saw a 10% increase in traffic, a 5% increase in online store conversion rate, and a 15% increase in revenue.

[PERMALINK](#) [SHARE ON TWITTER](#)

#bounce rate #conversion rate #traffic #revenue #2023 #core web

Credit: <https://wpostats.com/>



Optimize

Layout Shift

- Chrome DevTools:
 - → Console Drawer
 - → Rendering
 - → Layout Shift
 - → Core Web Vitals
- Chrome Plugins
- [https://defaced.dev/tools/
layout-shift-gif-generator/](https://defaced.dev/tools/layout-shift-gif-generator/)
- npm install -g layout-shift-gif
- JS Performance Observer
API → Tracking



Platz freihalten gegen Layout-Shift

Wer kennt den Padding-Trick?

```
.image-container {  
    position: relative;  
    padding-bottom: 56.25%;  
    /* 16:9 Format, 9/16*100 */  
}  
.image-container img {  
    position: absolute;  
}
```

Der Container des Bildes bekommt einen Padding-Bottom entsprechend des Bildverhältnisses. Das funktioniert, weil sich ein prozentuales Padding an der Breite des Containers orientiert. In den entsprechend dimensionierten Container passt das Bild (absolut positioniert, um nicht unter dem Padding zu landen) genau rein.

Platz freihalten gegen Layout-Shift

Und wer kennt aspect-ratio?



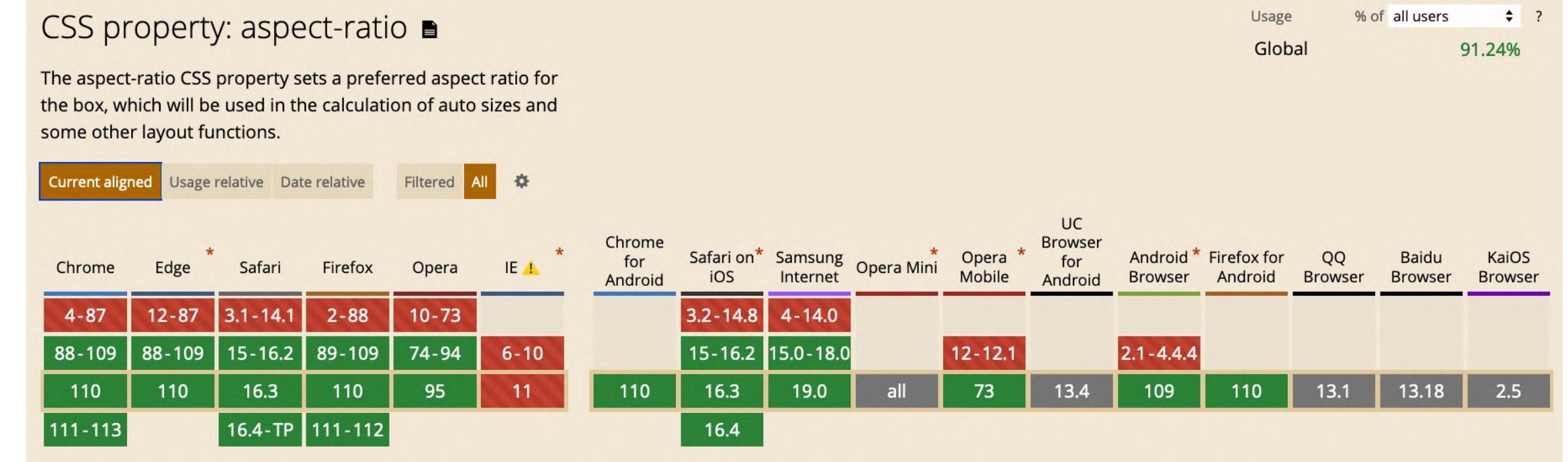
```
.img {  
    aspect-ratio: 1.777;  
    aspect-ratio: 16/9;  
}
```

aspect-ratio definiert für Box-Elemente automatisch die Höhe anhand der Breite.

Der Wert ist eine Dezimalzahl, die man aber auch durch einen Bruch angeben kann.

Platz freihalten gegen Layout-Shift

Und wer kennt aspect-ratio?

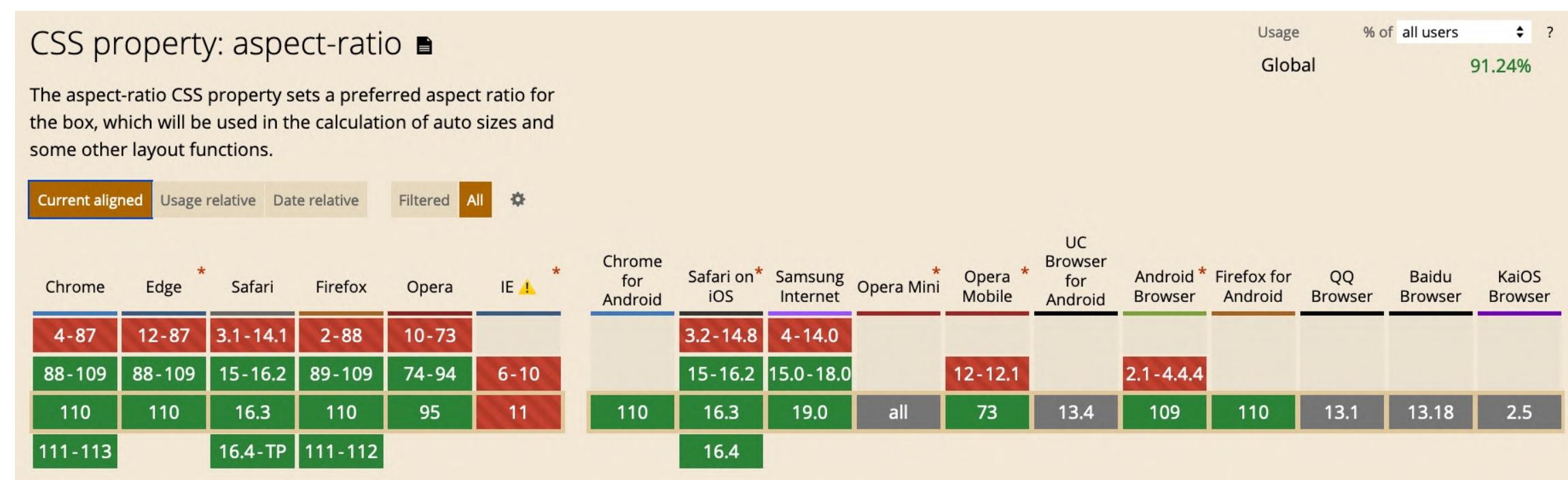


Platz freihalten gegen Layout-Shift

Und wer kennt aspect-ratio?

```
.img {  
    aspect-ratio: 16/9;  
}
```

aspect-ratio definiert für Box-Elemente automatisch die Höhe anhand der Breite.



Layout Shift

- Layout Shift mit den DevTools messen:
vorher und nachher
- Platz für "Hero-Image" oder andere Elemente via
`aspect-ratio` frei halten

hands-on



Credit: Pitch Sticker "Cyberpunk"

Optimize

Lazy Loading

Fassaden

Font Loading

Font Display

Rel=Preload

Layout Shift

Fünf Säulen von Website Performance

A

AVOID

Benutzen wir alles?
Brauchen wir alles?

R

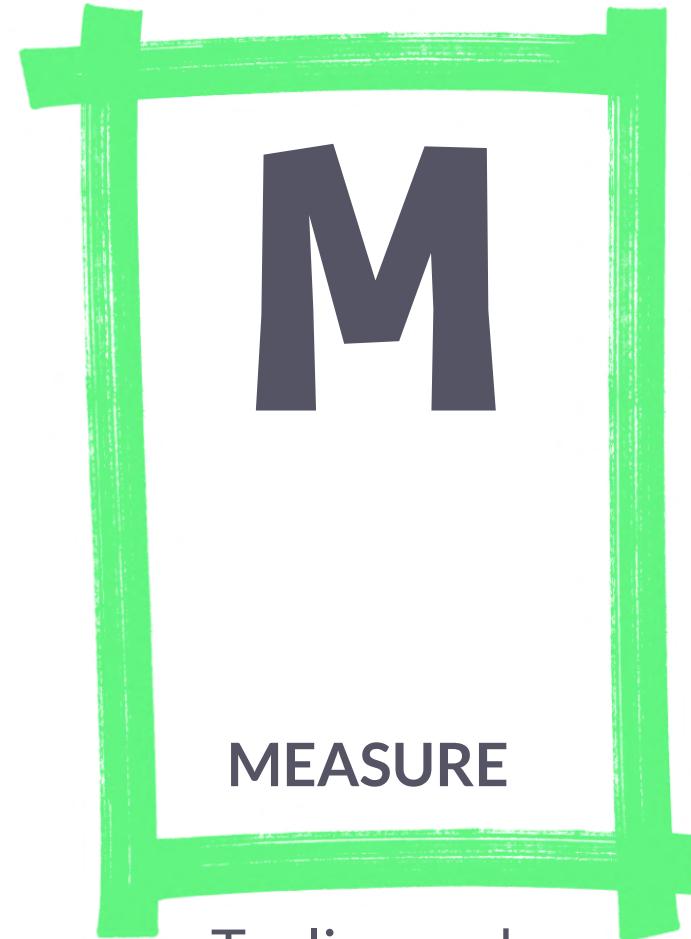
REDUCE

Cachen,
Komprimieren,
Minimieren.

O

OPTIMIZE

Ladeverhalten und
Priorisierung



A

ATTITUDE

Performance
Culture

Pause



Credit: Pitch Sticker "Cyberpunk"

A woman with short blonde hair, wearing a red dress, stands next to a man in a dark suit. They are outdoors, with trees and a body of water in the background. A large circular graphic is overlaid on the right side of the image, containing the word "Measure".

Measure

hulu Disney+

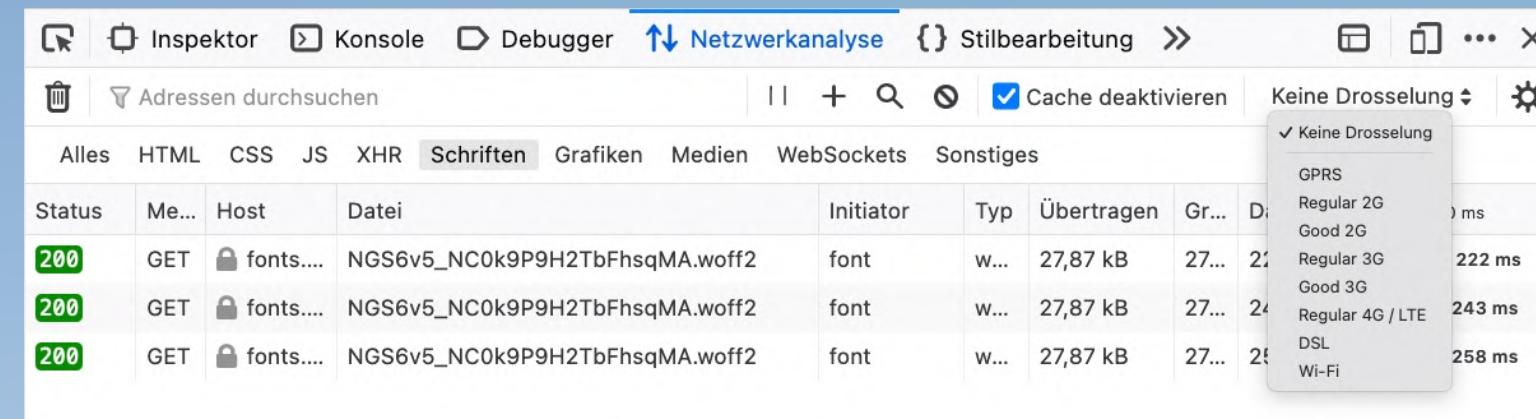
Measure

DevTools

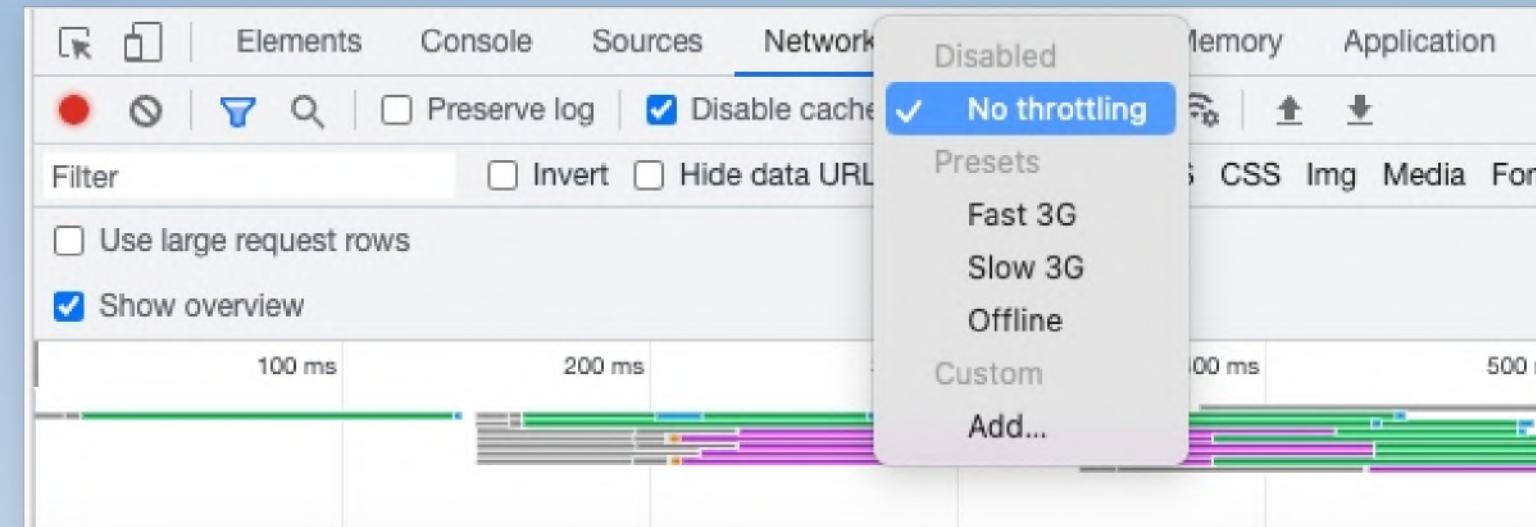
Measure

DevTools

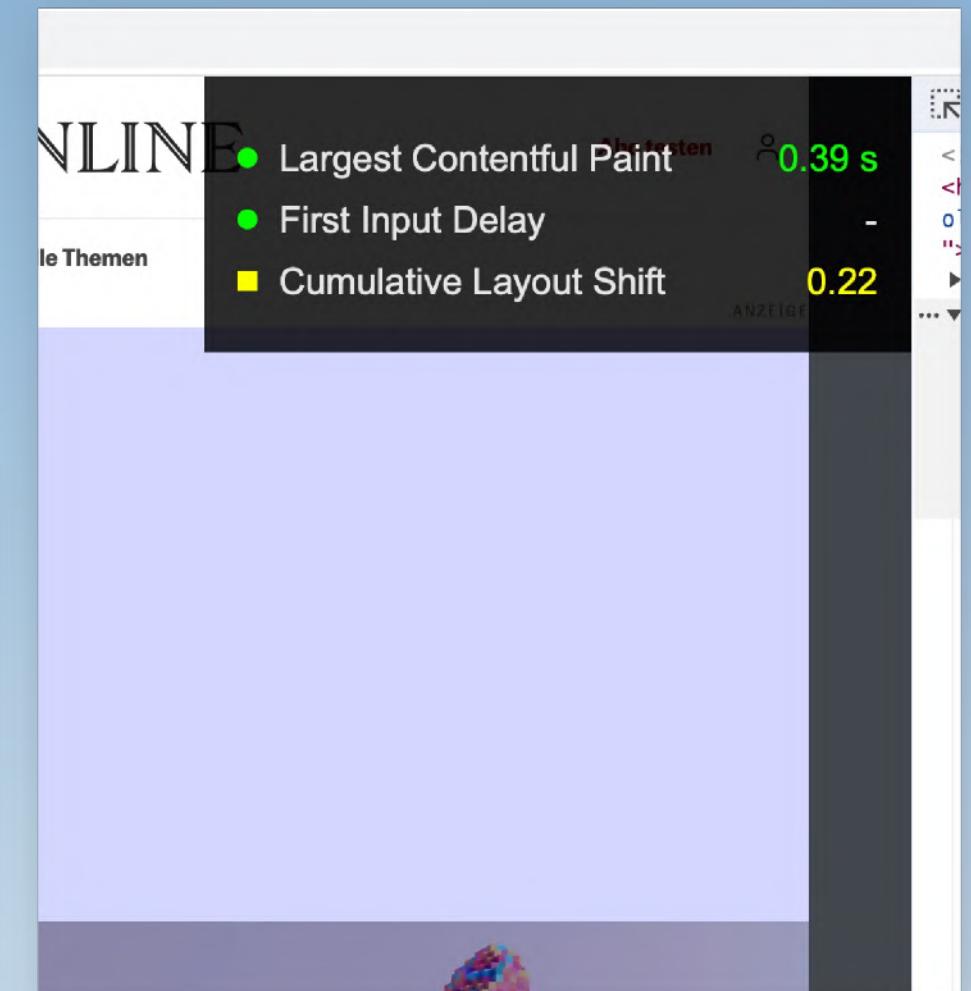
- Throttling
 - Local Source Overrides
 - Web Vitals Score
 - Layout Shift
 - Unused CSS/JS
-
- **JavaScript:** Memory, Frame Rate, CPU Flame Graphs



The screenshot shows the Network tab in the Chrome DevTools Network panel. It displays a list of network requests. Three requests for the font file 'NGS6v5_Neue-Schriftart.woff2' are listed, each with a status of 200, indicating a successful download. The table includes columns for Status, Method, Host, Datei, Initiator, Typ, Übertragen, Gr., and D. A context menu is open over the third request, showing options like 'Keine Drosselung' (No Throttling) and 'GPRS' through 'DSL' and 'Wi-Fi'.



The screenshot shows the Network tab in the Chrome DevTools Network panel. The throttling dropdown is open, showing various options: 'Disabled', 'Memory', 'Application', and 'Network'. The 'No throttling' option is selected. Other options include 'Presets' (Fast 3G, Slow 3G, Offline), 'Custom', and 'Add...'. Below the dropdown, there are two timeline visualizations: one for '100 ms' and one for '200 ms'.



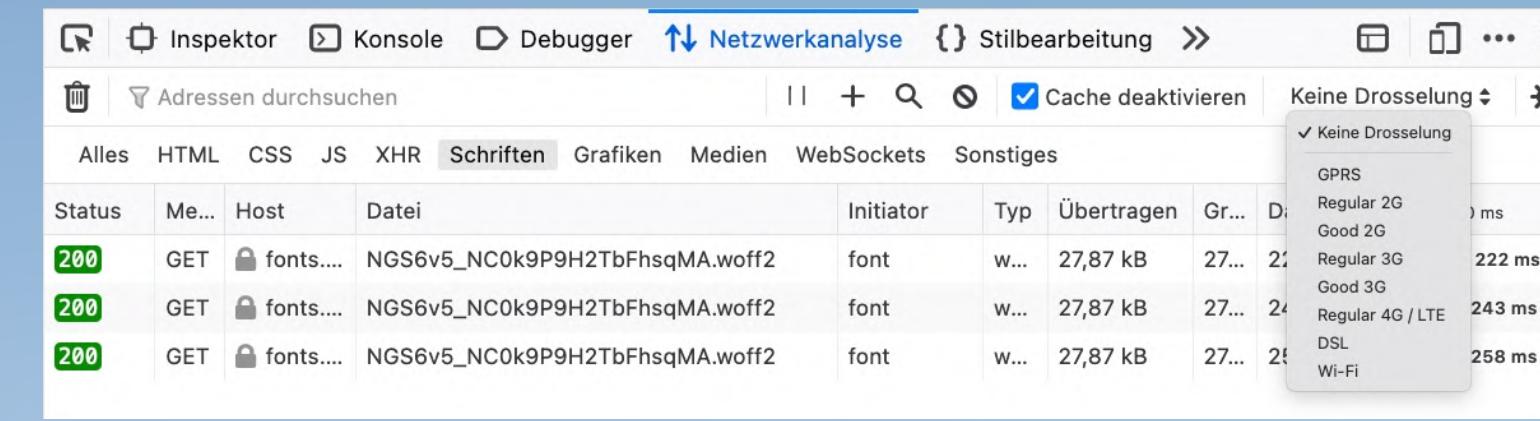
Name	Status	Type	Size	Time	Priority	Waterfall
after.html	304	document	80 B	70 ms	Highest	
Montserrat-Regular.woff2	200	font	(disk cache)	16 ms	High	
normalize.css	200	stylesheet	(disk cache)	15 ms	Highest	
styles-optimized.css	200	stylesheet	(disk cache)	8 ms	Highest	
hero.webp	200	webp	(disk cache)	12 ms	Low	

URL	Type	Total Bytes	Unused Bytes	Usage Visualization
https://consent-cdn.zeit.de/wrapperMessagingWithoutDetection.js	JS (per function)	204 217	95 490 46.8%	
https://interactive.zeit.de/wiegehtesি.../app.c0381a78a97b00cf65db.cached.js	JS (per function)	156 095	75 866 48.6%	
https://interactive.zeit.de/g/2022/energiemetermonitor/.../index.75ca3a4e.css	CSS	99 104	72 859 73.5%	
https://interactive.zeit.de/g/2022/energiemetermonitor/.../react.8d1c6deb.mjs	JS (per function)	142 733	67 107 47%	
https://static.zeit.de/p.../centerpage.92c7290fe3f64752971581ffeb39d5b6.css	CSS	97 335	62 054 63.8%	
https://static.zeit.de/p/zeit....base.4ac770b16c740c03c50e84fb93f1dd9.css	CSS	49 036	38 825 79.2%	
https://static.zeit.de/static/js/webtrekk/webtrekk_v4.5.3.min-3.js	JS (per function)	75 896	30 541 40.2%	

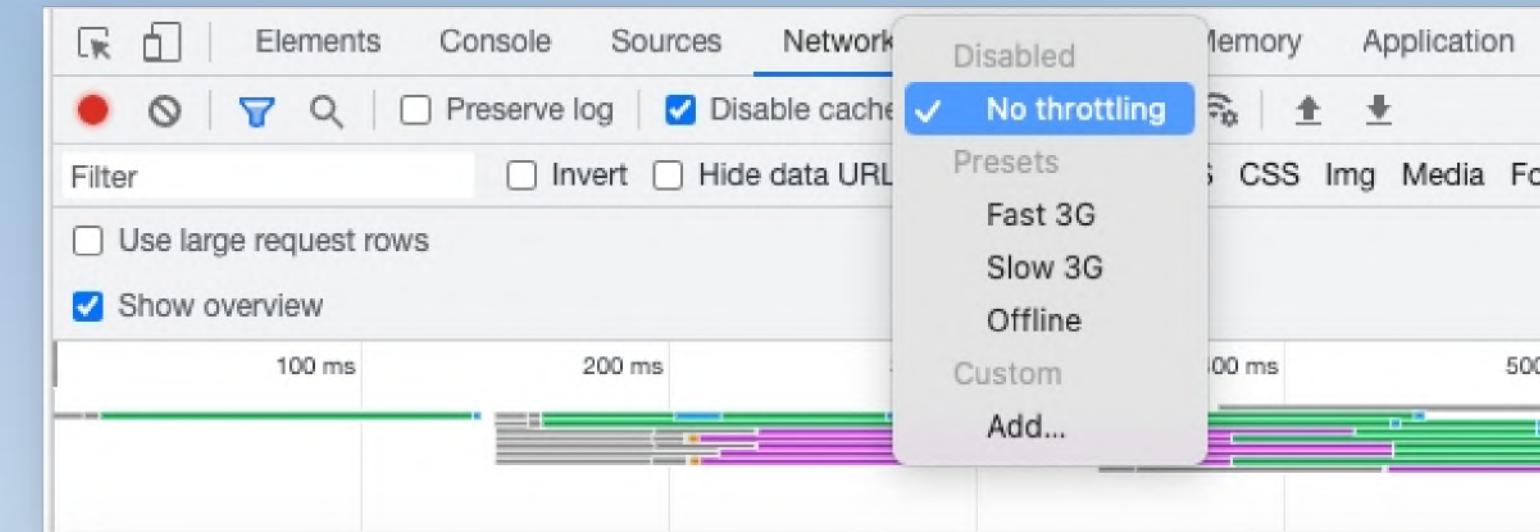
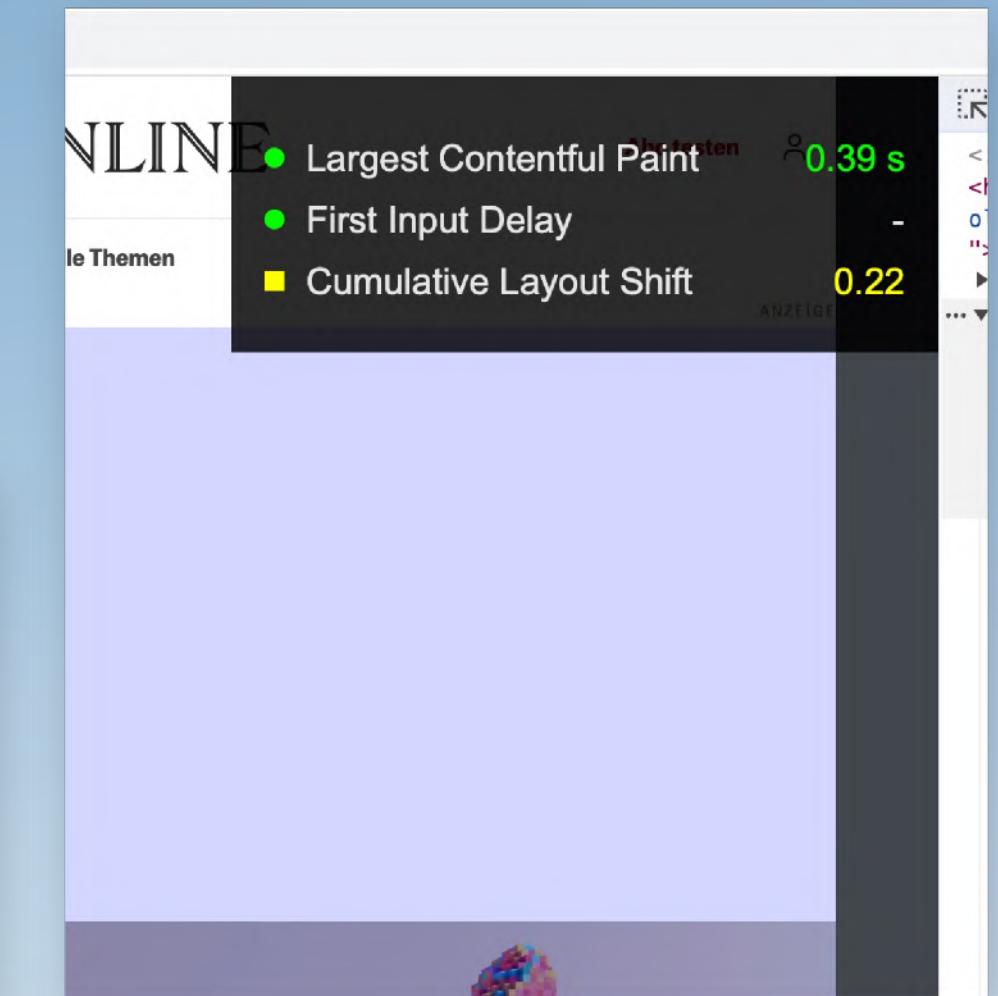
Measure

DevTools

- Throttling
 - Local Source Overrides
 - Web Vitals Score
 - Layout Shift
 - Unused CSS/JS
-
- **JavaScript:** Memory, Frame Rate, CPU Flame Graphs



The screenshot shows the Network tab in the Chrome DevTools. It lists three GET requests for font files: 'NGS6v5_NC0k9P9H2TbFhsqMA.woff2' (status 200). The 'Schriften' tab is selected. A context menu is open over the third request, showing options like 'Keine Drosselung' (No Throttling) and 'GPRS' with various connection speeds and their corresponding latencies.



The screenshot shows the Network tab in the Chrome DevTools with the 'Throttling' dropdown open. The 'No throttling' option is selected. Other options include 'Fast 3G', 'Slow 3G', 'Offline', 'Custom', and 'Add...'. Below the dropdown, there's a timeline visualization showing request times.

Name	Status	Type	Size	Time	Priority	Waterfall
after.html	304	document	80 B	70 ms	Highest	
Montserrat-Regular.woff2	200	font	(disk cache)	16 ms	High	
normalize.css	200	stylesheet	(disk cache)	15 ms	Highest	
styles-optimized.css	200	stylesheet	(disk cache)	8 ms	Highest	
hero.webp	200	webp	(disk cache)	12 ms	Low	

URL	Type	Total Bytes	Unused Bytes	Usage Visualization
https://consent-cdn.zeit.de/wrapperMessagingWithoutDetection.js	JS (per function)	204 217	95 490 46.8%	
https://interactive.zeit.de/wiegehtesি.../app.c0381a78a97b00cf65db.cached.js	JS (per function)	156 095	75 866 48.6%	
https://interactive.zeit.de/g/2022/energiekostenmonitor/.../index.75ca3a4e.css	CSS	99 104	72 859 73.5%	
https://interactive.zeit.de/g/2022/energiekostenmonitor/.../react.8d1c6deb.mjs	JS (per function)	142 733	67 107 47%	
https://static.zeit.de/p.../centerpage.92c7290fe3f64752971581ffeb39d5b6.css	CSS	97 335	62 054 63.8%	
https://static.zeit.de/p/zeit....base.4ac770b16c740c03c50e84fb93f1dd9.css	CSS	49 036	38 825 79.2%	
https://static.zeit.de/static/js/webtrekk/webtrekk_v4.5.3.min-3.js	JS (per function)	75 896	30 541 40.2%	

devtoolstips.org

Measure

DevTools

Lighthouse

Measure

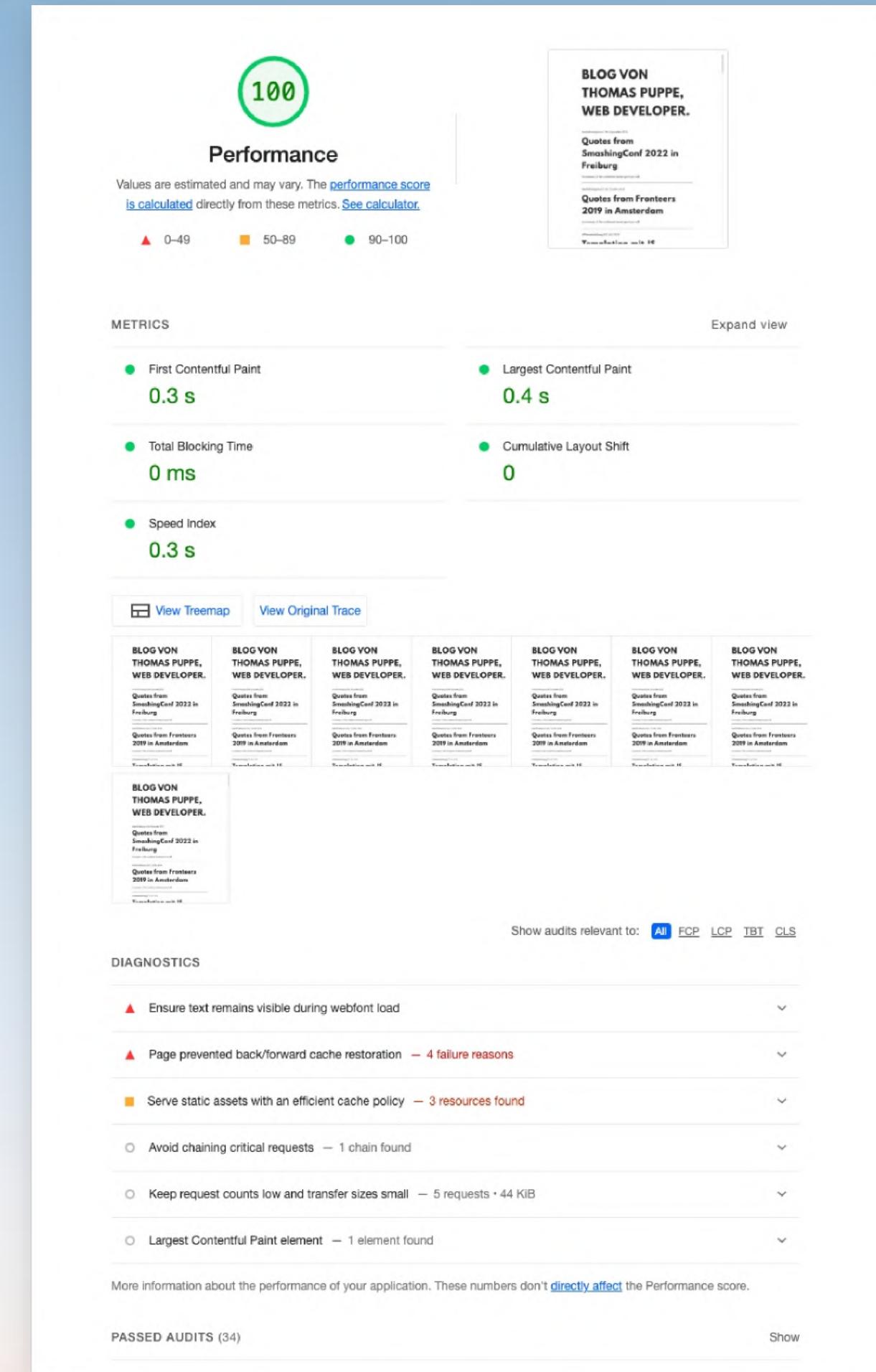
Lighthouse

- DevTools

- CLI

- `npm install -g lighthouse`

- npx lightouse



Measure

DevTools

Lighthouse

Page Speed Insights

Measure

Pagespeed Insights

pagespeed.web.dev

PageSpeed Insights

Mobil Computer

98 Leistung

Die Werte sind geschätzt und können variieren. Die Leistungsbewertung wird direkt aus diesen Messwerten berechnet. Siehe Rechner.

▲ 0–49 ■ 50–89 ■ 90–100

MESSWERTE

Ansicht maximieren

First Contentful Paint 1,1 s	Largest Contentful Paint 2,2 s
Total Blocking Time 0 ms	Cumulative Layout Shift 0,021
Speed Index 1,1 s	

Captured at 15. Okt. 2023, 21:01 MESZ Emulation eines Moto G Power with Lighthouse 11.0.0 Einzelner Seitenaufbau

Erster Seitenaufbau Langsame 4G-Drosselung Using HeadlessChromium

117.0.5938.149 with lr

Strukturkarte anzeigen

Prüfungen anzeigen, die für folgende Messwerte relevant sind: All FCP LCP TBT CLS

EMPFEHLUNGEN

Geschätzte Einsparung

Bilder in modernen Formaten bereitstellen 4,41 Sek ▾

Bilder richtig dimensionieren 4,25 Sek ▾

Stelle Bilder bereit, die eine angemessene Größe haben, um mobile Daten zu sparen und die Ladezeit zu verbessern.
[Weitere Informationen](#)

Measure

DevTools

Lighthouse

Page Speed Insights

Webpagetest

Measure

Webpagetest

[webpagetest.org](https://www.webpagetest.org)

Platform > WebPageTest

URL: <https://javascript-days.de/berlin/>
DATE: 15.10.2023, 21:18:58

WebPageTest Pro Experiment

Experiment SETTINGS: DESKTOP v118 Cable Frankfurt, Germany

More Share

View: Experiment Results & Filmstrip

Tools: Export

Experiment Results

EXPERIMENTS APPLIED: Defer Render-Blocking Scripts ▾ Async Render-Blocking Scripts ▾ Inline Render-Blocking Scripts ▾ Add loading="lazy" to images ▾

LINKS: Experiment Results Experiment Control Original

Experiment Impact

(Notable changes between experiment and control)

Start Render	First Contentful Paint	Speed Index	Total Blocking Time	Page Weight
0.2s FASTER Experiment: 1.8s Control: 2s	0.15s FASTER Experiment: 1.78s Control: 1.93s	0.48s SLOWER Experiment: 14.8s Control: 14.33s	0.16s FASTER Experiment: 0.72s Control: 0.88s	69 KB HEAVIER Experiment: 8863 KB Control: 8794 KB

Measure

Webpagetest

[webpagetest.org](https://www.webpagetest.org)

und

perfproxy.com

zum Erzeugen von mehr
Experimenten

Performance Proxy

Enter a URL and select performance optimisations, a resulting URL will be generated for testing.

Cross-origin images will not be optimised. Failure is probable with all optimisations. Test with Chrome for most reliable results.

Made for personal experimental use only by [Simon Hearne](#). [Contribute on GitHub](#).

URL
Target URL:
`https://lama.thomaspuppe.de/after.html`

Feature Toggles

- Remove Preload Fonts
- Remove Preload Scripts
- Remove Preload Images
- Remove Preload Styles
- Defer Scripts
- Add decoding="async" to elements
- Add loading="lazy" to elements
- Swap for
- Defer external CSS
- Remove inline CSS
- Un-async external CSS
- Optimise Images (experimental)
- Remove Google Fonts CSS

Advanced Features

Add `fetchpriority="low" and loading="lazy"` by `querySelector` (each on a new line)

```
.mega-nav img
```

Add `fetchpriority="high" and loading="eager"` by `querySelector` (each on a new line)

```
.hero-carousel .hero-el:first-child img.hero
```

Injections (each on a new line)

Top of <html>

```
<meta name='viewport' content='width=device-width,initial-scale=1,shrink-to-fit=no'>
```

Top of <head>

WebPageTest Script

```
overrideHost lama.thomaspuppe.de lama_thomaspuppe_de.perfproxy.com
navigate https://lama.thomaspuppe.de/after.html?_pp=1E22-13
```

[Open WebPageTest](#). Read more about [WebPageTest scripts here](#).

Measure

DevTools

Lighthouse

Page Speed Insights

Webpagetest

Speedcurve

Measure

Speedcurve

speedcurve.com



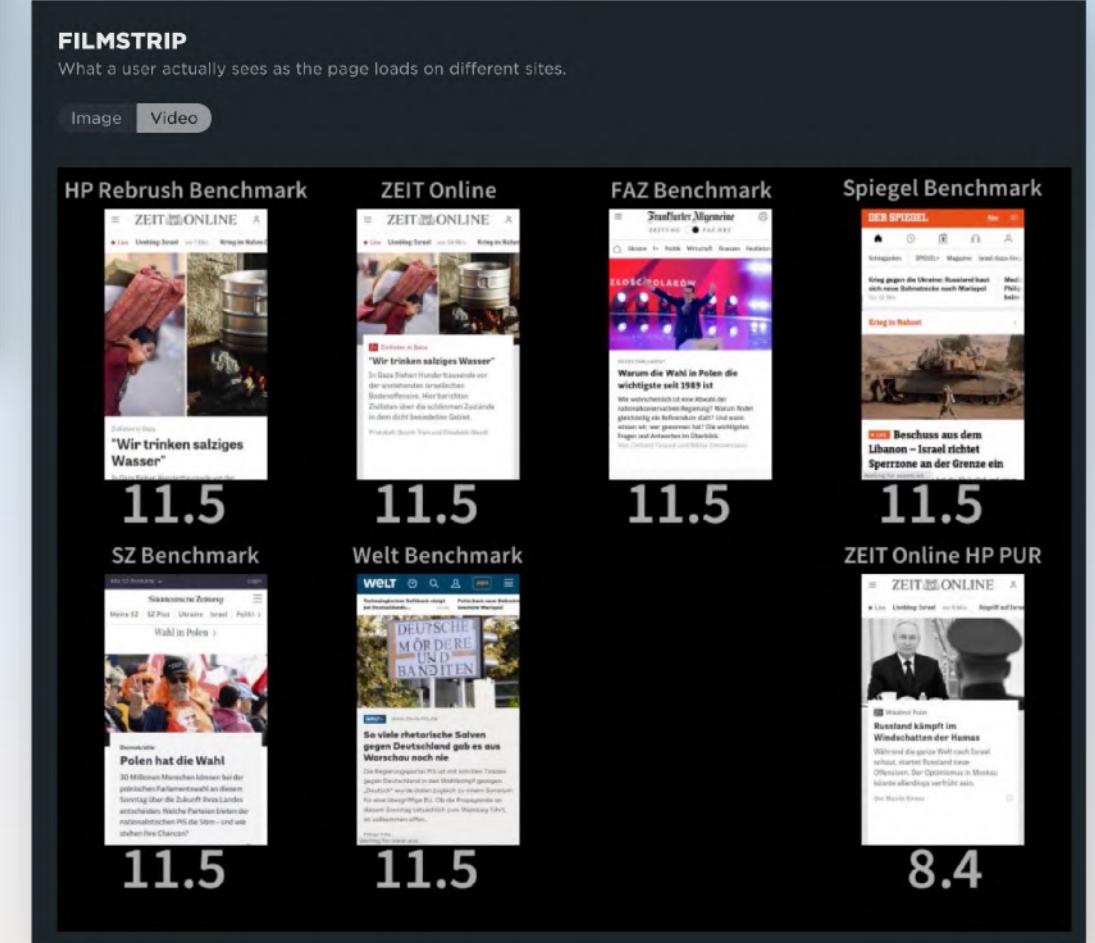
PAGE VIEWS BY PAGE LABEL ▾

Find the slowest areas of your site.

PAGE LABEL	% OF PAGE VIEWS	BACKEND (TTFB)	START RENDER	LARGEST CONTENTFUL PAINT	CUMULATIVE LAYOUT SHIFT	INTERACTION TO NEXT PAINT
site.article	52%	0.12s	0.55s	0.74s	0	51ms
site.centerpage	40%	0.17s	0.71s	0.78s	0	32ms
arbeit.article	3%	0.15s	0.55s	0.89s	0	48ms
magazin.article	3%	0.15s	0.53s	1.07s	0	40ms
site.userprofile	< 1%	0.34s	0.63s	0.66s	0	24ms
zett.article	< 1%	0.46s	0.75s	0.79s	0	19ms
campus.article	< 1%	0.26s	0.83s	1.29s	0.01	16ms
magazin.centerpage	< 1%	0.31s	0.84s	1.17s	0	9ms
wochenende.centerpage	< 1%	0.14s	0.56s	2.33s	0	216ms
site.gallery	< 1%	0.14s	0.38s	1.49s	0.08	24ms
site.rawxml	< 1%	0.62s	1.04s	1.24s	0	8ms

RECOMMENDATIONS

Recommendation	Synthetic Impact
Page prevented back/forward cache restoration	100%
Image elements do not have explicit `width` and `height` <small>CLS</small>	100%
Does not use passive listeners to improve scrolling performance	100%
Some third-party resources can be lazy loaded with a facade <small>TBT</small>	100%
Reduce the impact of third-party code <small>TBT</small>	100%
Ensure text remains visible during webfont load <small>LCP</small>	100%
Avoid an excessive DOM size <small>TBT</small>	100%



Measure

DevTools

Lighthouse

Page Speed Insights

Webpagetest

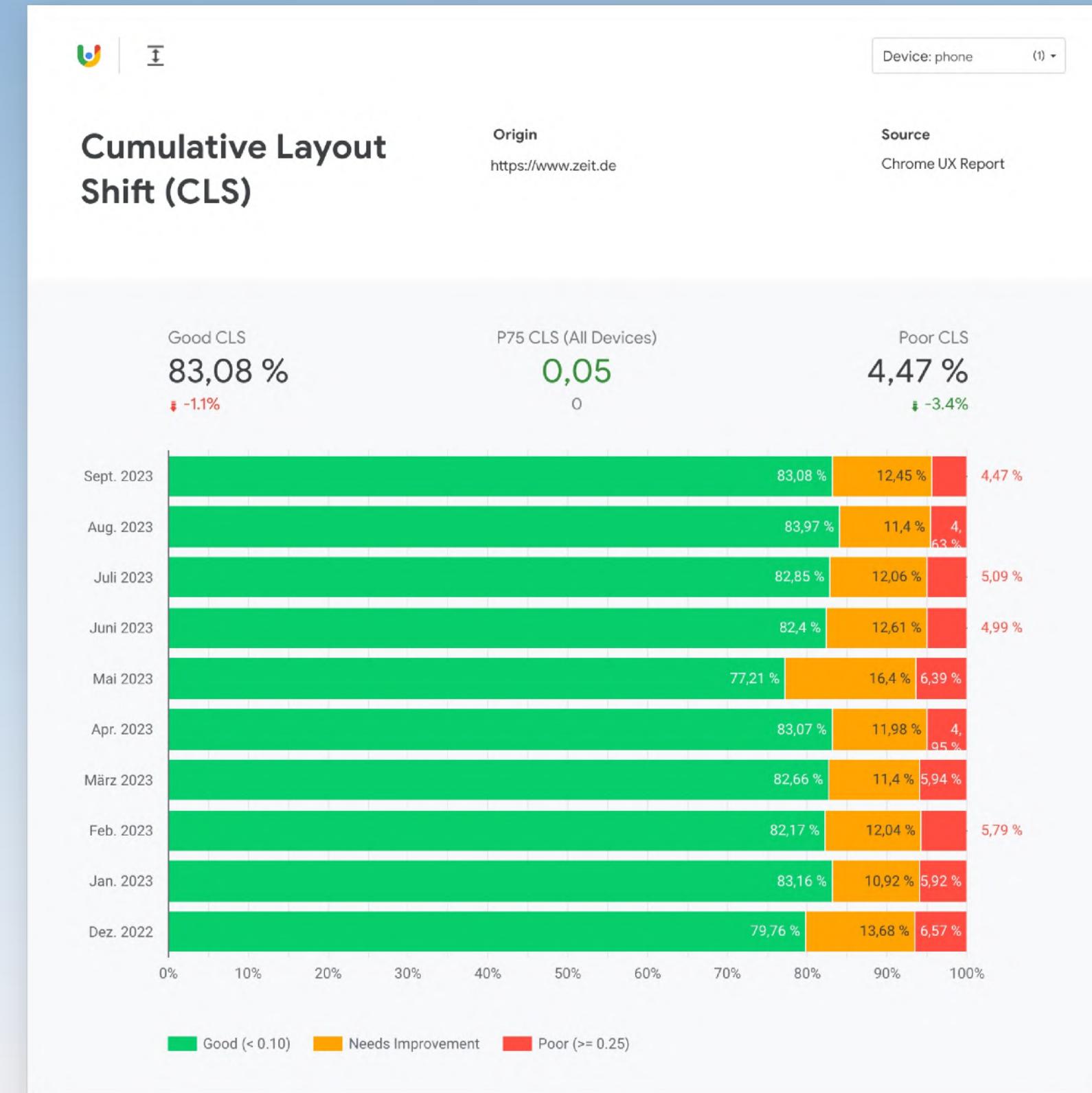
Speedcurve

CrUX

Measure

CrUX

[developer.chrome.com/
docs/crux/dashboard/](https://developer.chrome.com/docs/crux/dashboard/)



Fünf Säulen von Website Performance

A R O M A

AVOID

Benutzen wir alles?

Brauchen wir alles?

REDUCE

Cachen,
Komprimieren,
Minimieren.

OPTIMIZE

Ladeverhalten und
Priorisierung

MEASURE

Tooling und
Monitoring





Attitude

I don't need to outrun the bear



I just need to outrun YOU!

Attitude

Regression vermeiden

Regression vermeiden

- Permanentes Monitoring
 - synthetisch
 - ggf RUM
 - monatliche CrUX Reports
- Performance Budgets
 - npm Pakete
 - CSS Output
 - Alerts von Speedcurve, Webpagetest, ...

Attitude

Regression vermeiden

Performance Culture

Performance Culture

- Buy-In von der Chefetage
 - Zahlen
 - Dashboards
 - Benchmarking !

Performance Culture

- Buy-In von der Chefetage
 - Zahlen
 - Dashboards
 - Benchmarking !



Performance Culture

- Buy-In von der Chefetage
 - Zahlen
 - Dashboards
 - Benchmarking !
- Performance als Feature
 - in NFRs aufnehmen
 - BUG-Tickets schreiben



Attitude

Regression vermeiden

Performance Culture

Up-to-date bleiben

Up-to-date bleiben

- web.dev/fast
- github.com/davidsonfellipe/awesome-wpo
- www.smashingmagazine.com/category/performance/
- perfplanet.com

- calibreapp.com/blog
- speedcurve.com/blog
- debugbear.com/blog

- simonhearne.com/posts
- csswizardry.com/archive
- timkadlec.com/remembers



Dankeschön ❤



Dankeschön ❤

Thomas is hiring @ ZEIT Online: dev.zeit.de



Dankeschön ❤

Thomas is hiring @ ZEIT Online: dev.zeit.de

www.thomaspuppe.de

<https://webperf.social/@thomaspuppe>