

Website Performance

Thomas Puppe auf den JS Days Berlin 2023



Hi, ich bin Thomas 🖐️

Senior Frontend Developer bei ZEIT Online

#a11y, #leanweb, #webperf



JS

A



JavaScript, Angular, React and HTML & CSS Days



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MacBook Pro



Mover. Maker. Boundary breaker.

Supercharged by M2 Pro or M2 Max, MacBook Pro takes its power and efficiency further than ever. It delivers exceptional performance whether it's plugged in or not, and now has even longer battery life. Combined with a stunning Liquid Retina XDR display and all the ports you need — this is a pro laptop without equal.

From \$1999

[Watch the announcement](#)

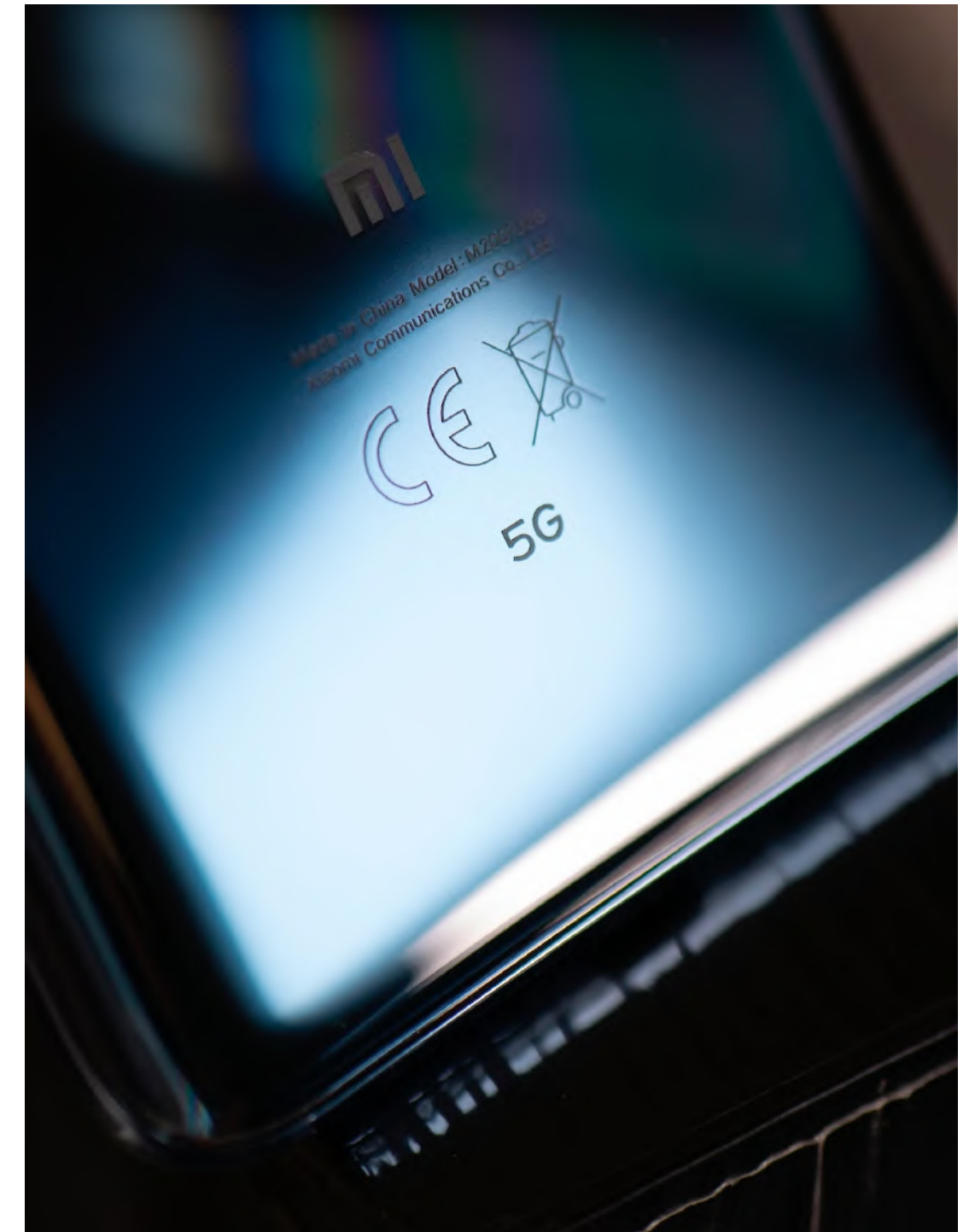
Supercharged by



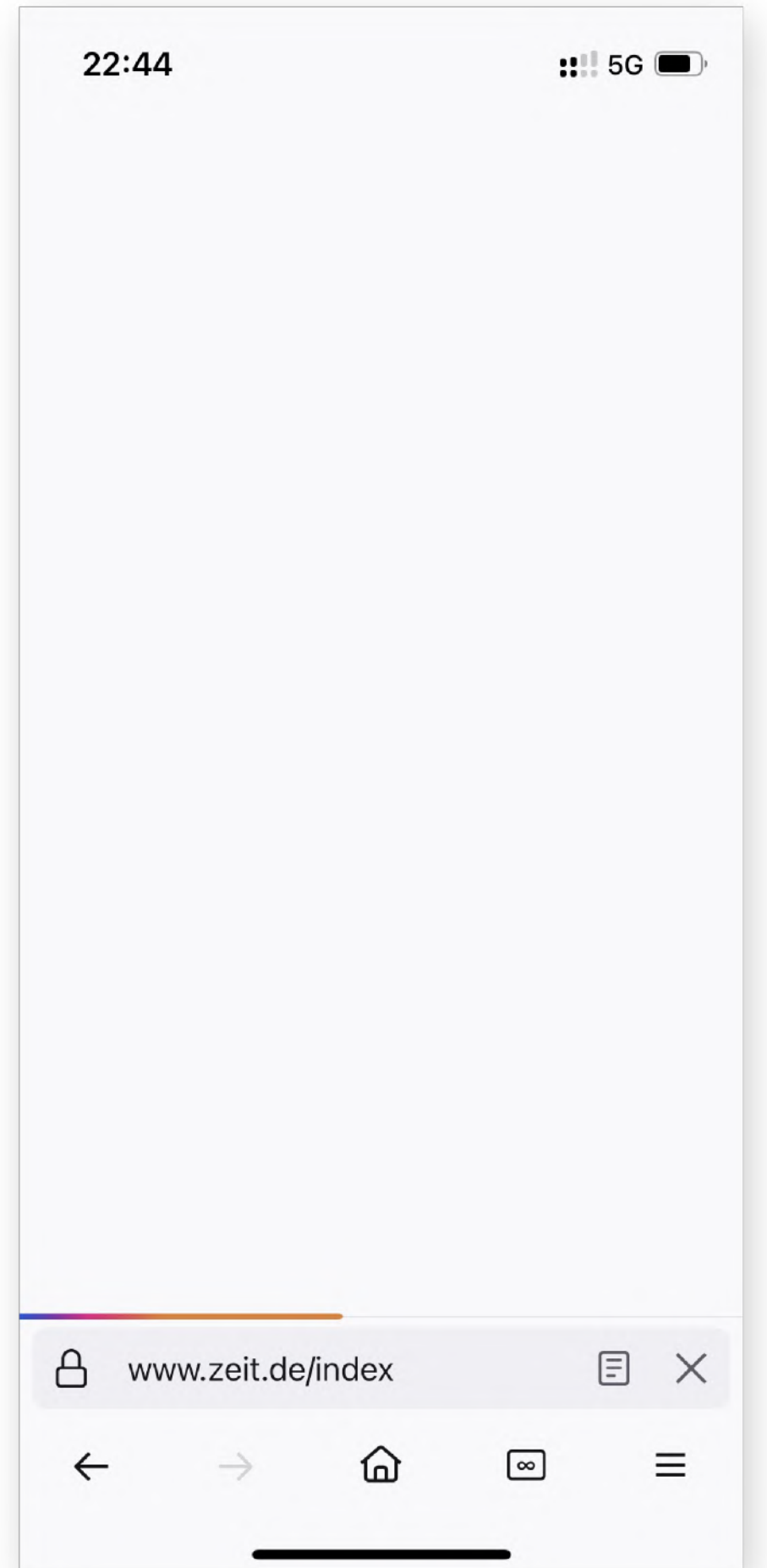
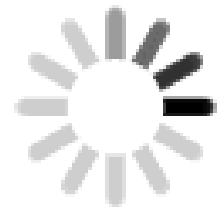
Up to 12-core CPU
Up to 19-core GPU
Up to 32GB unified memory
200GB/s memory bandwidth



12-core CPU
Up to 38-core GPU
Up to 96GB unified memory
400GB/s memory bandwidth



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

LCP

**window
loaded**

**Download
Size**

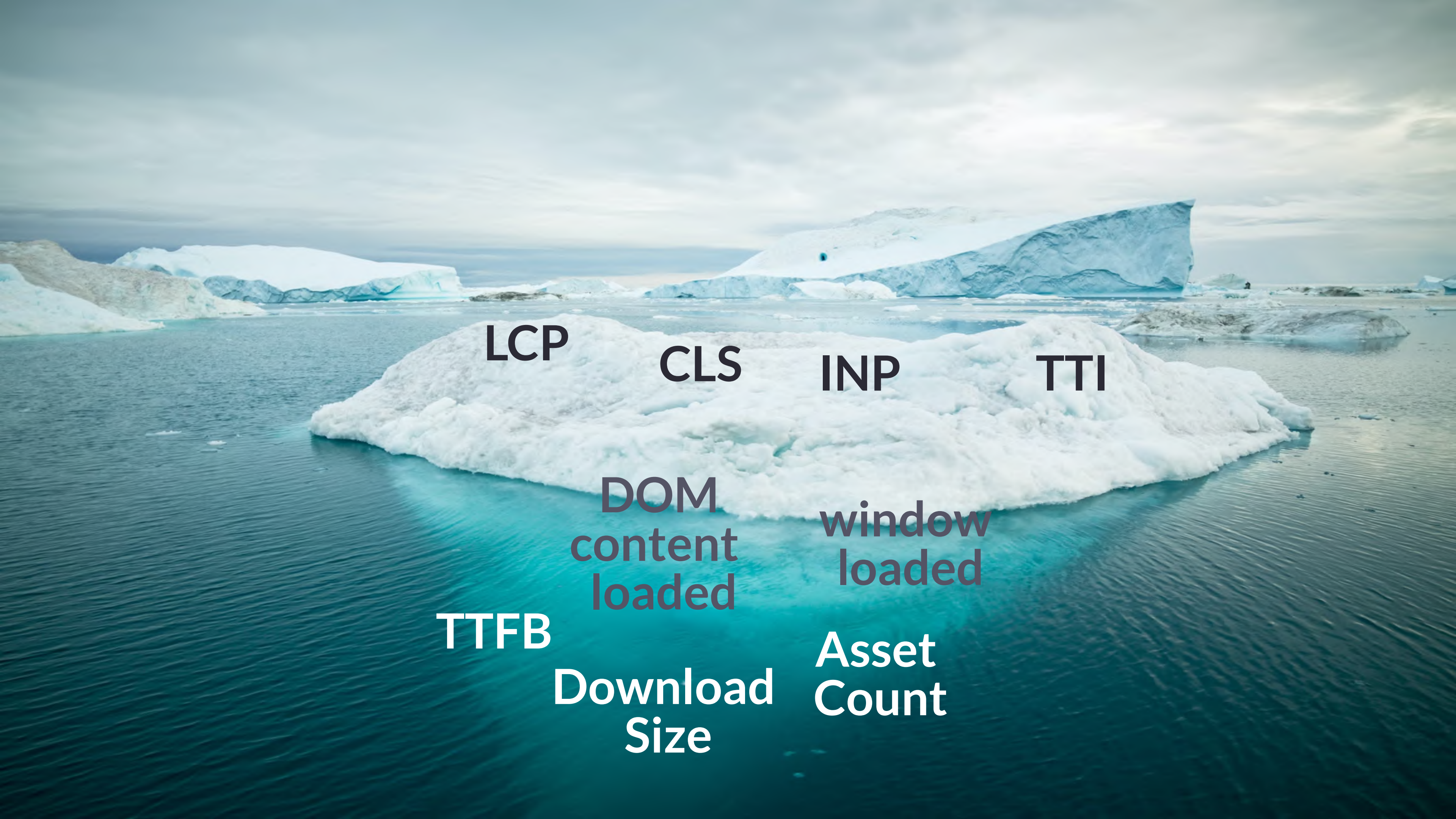
CLS

**Asset
Count**

**DOM
content
loaded**

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

AVOID

Benutzen wir alles?
Brauchen wir alles?

R

REDUCE

Cachen,
Komprimieren,
Minimieren.

O

OPTIMIZE

Ladeverhalten und
Priorisierung

M

MEASURE

Tooling und
Monitoring

A

ATTITUDE

Performance
Culture

hands-on Workshop-Anteil



lama.thomaspuppe.de 🐫

github.com/thomaspuppe/performance-workshop

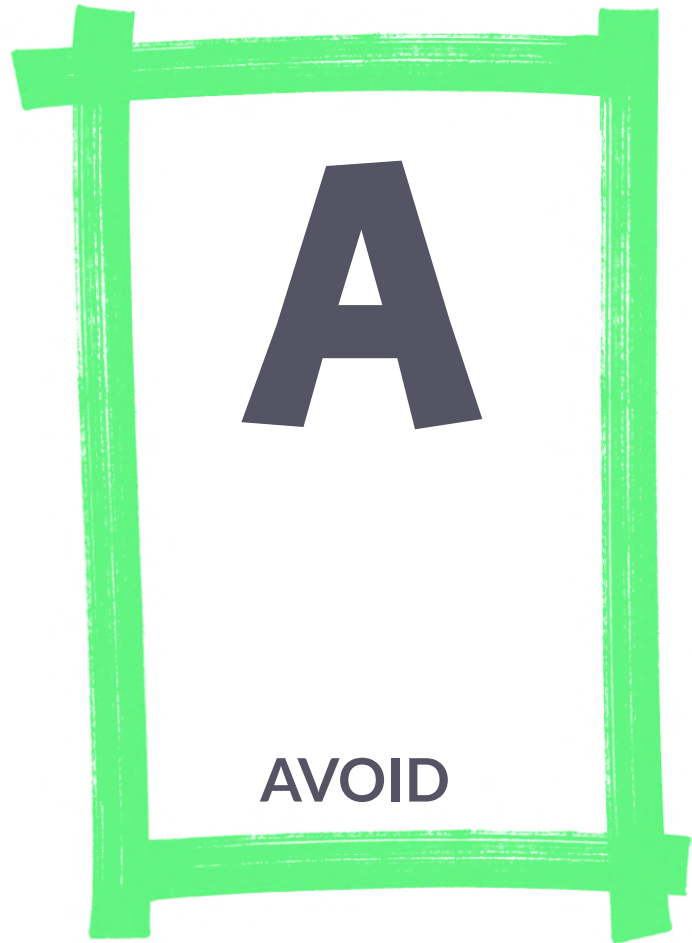


Dein Projekt 🍷😊

yoursuperawesomepremiumwebsite.com

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

Drei Fünf Säulen von Website Performance



AVOID

Benutzen wir alles?
Brauchen wir alles?

R

REDUCE

Cachen,
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O

OPTIMIZE

Ladeverhalten und
Priorisierung

M

MEASURE

Tooling und
Monitoring

A

ATTITUDE

Performance
Culture

A man with a beard and a shaved head is wearing a bright red, quilted puffer jacket. He is covering his ears with both hands, looking down with a distressed or pained expression. The background is a solid, bright yellow color. The word "AVOID" is written in large, bold, dark blue capital letters on the right side of the image.

AVOID

**Avoid Stuff:
ungenutzte
Sachen
finden**

Browser DevTools

The screenshot shows the Chrome DevTools Network Tab with the following configuration:

- Filter: `ain:*.zeit.de larger-than:100`
- Buttons: Preserve log, Disable cache, No throttling, Invert, Hide data URLs, Hide extension URLs
- Request Type: All (selected), Doc, JS, Fetch/XHR, CSS, Font, Img, Media, Manifest, WS, Wasm, Other
- Additional filters: Blocked response cookies, Blocked requests, 3rd-party requests

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

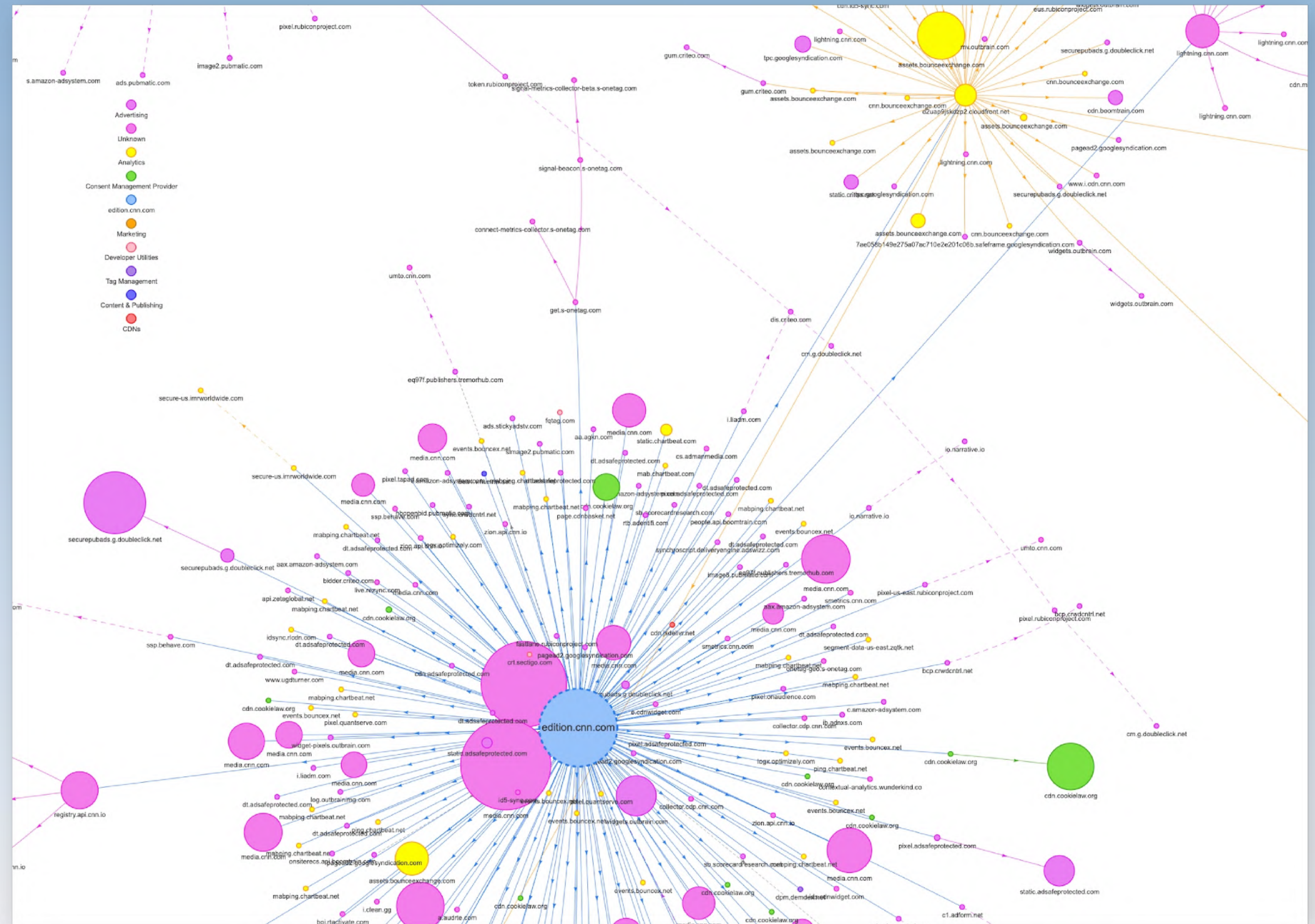
Avoid

Request Maps

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

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

Oder um Stakeholder zu beeindrucken!



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!

Please wait while your visualization is generated...
This can take a while depending on the complexity of the tested page.
We're rendering 378 nodes



Avoid

Request Maps

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**Avoid Stuff:
ungenutzte
Sachen
finden**

Browser DevTools

Request Maps

Google Tag Manager ausmisten

Avoid Stuff: ungenutzte Sachen finden

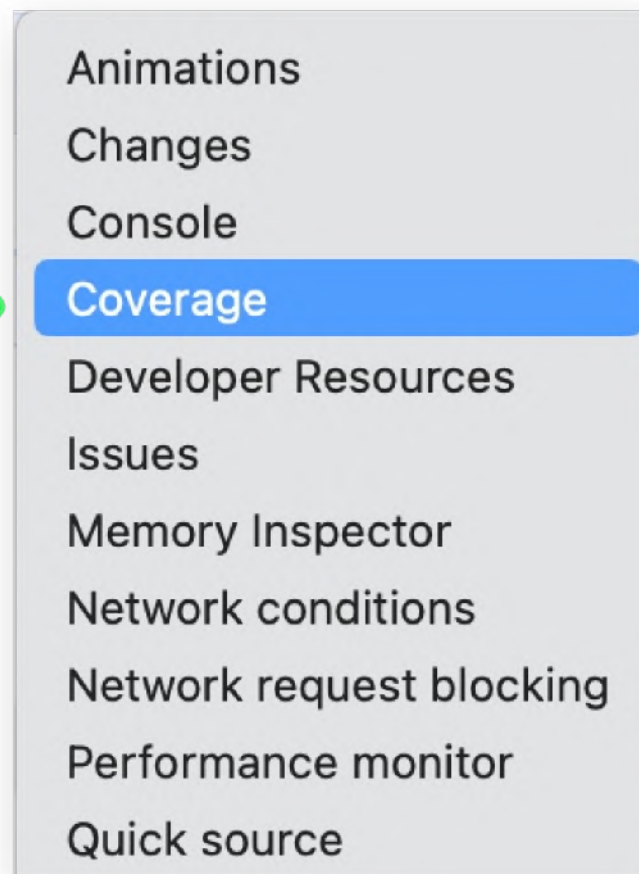
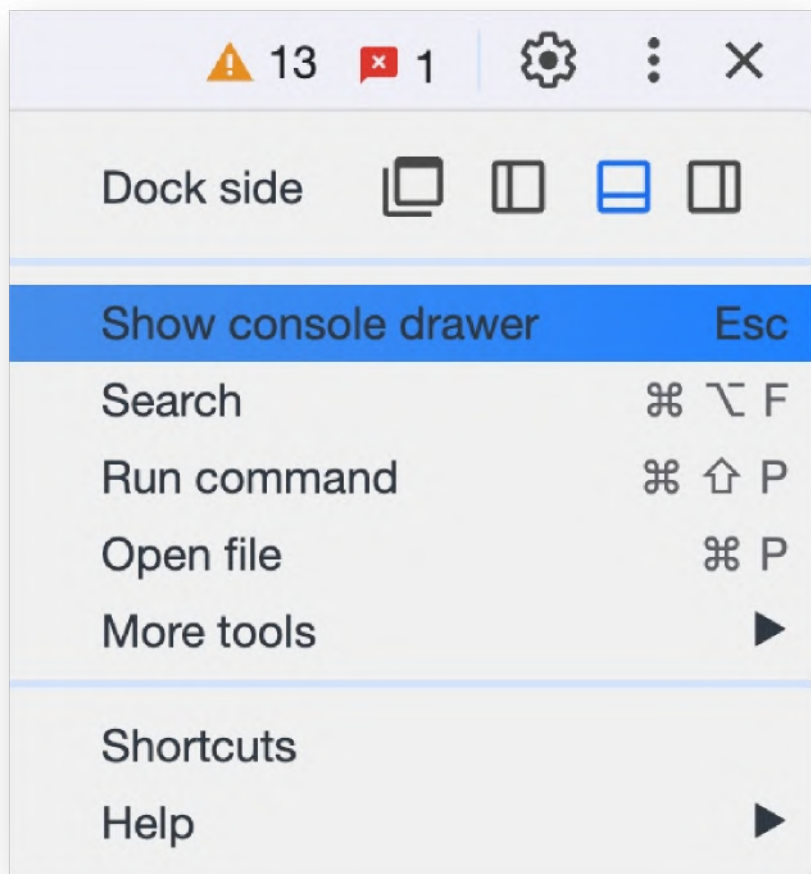
Browser DevTools

Request Maps

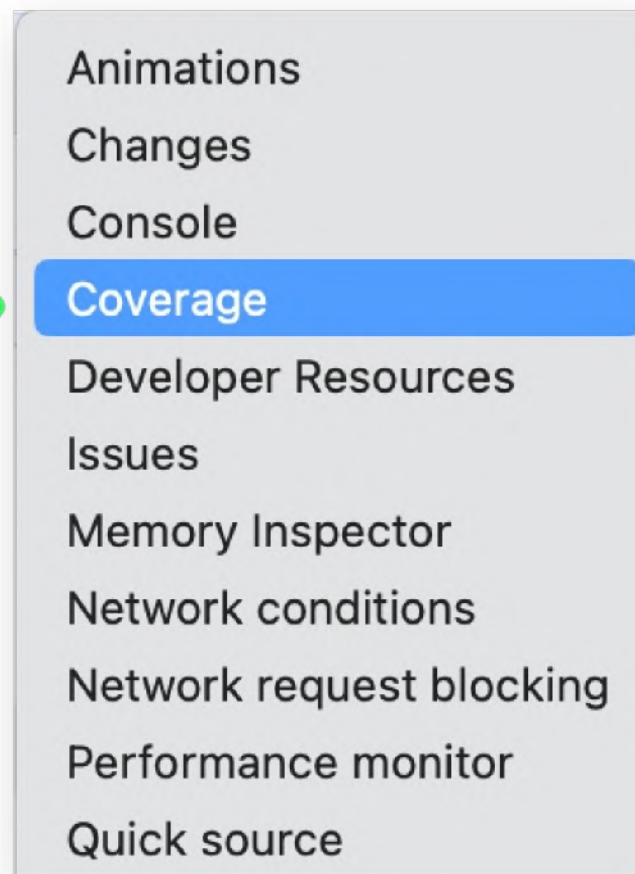
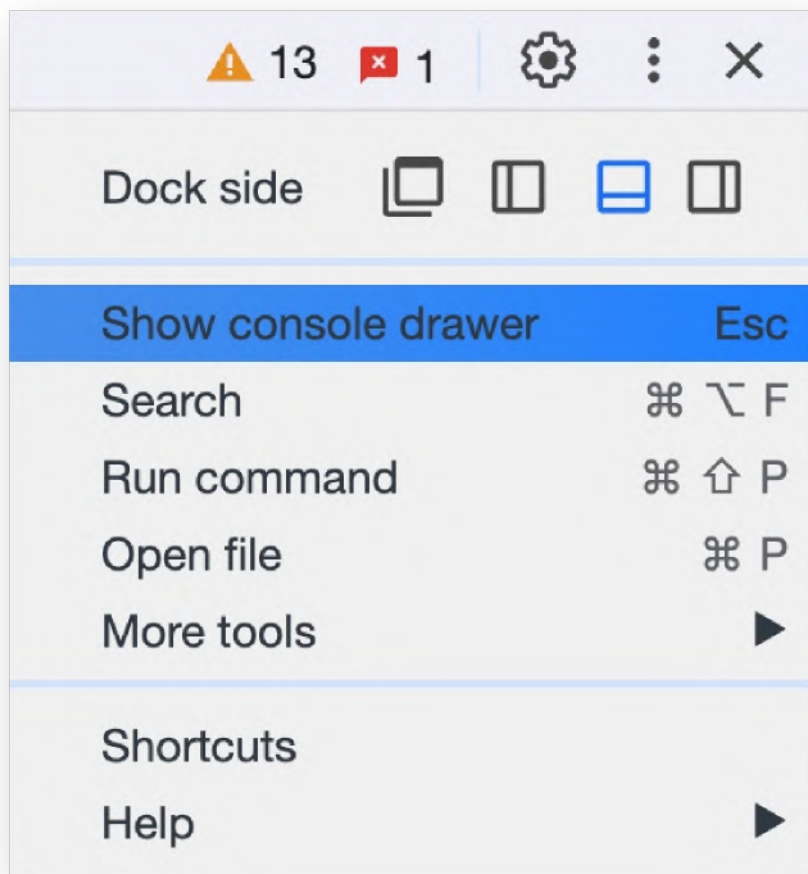
Google Tag Manager ausmisten

Unused CSS/JS via DevTools

Unused CSS/JS

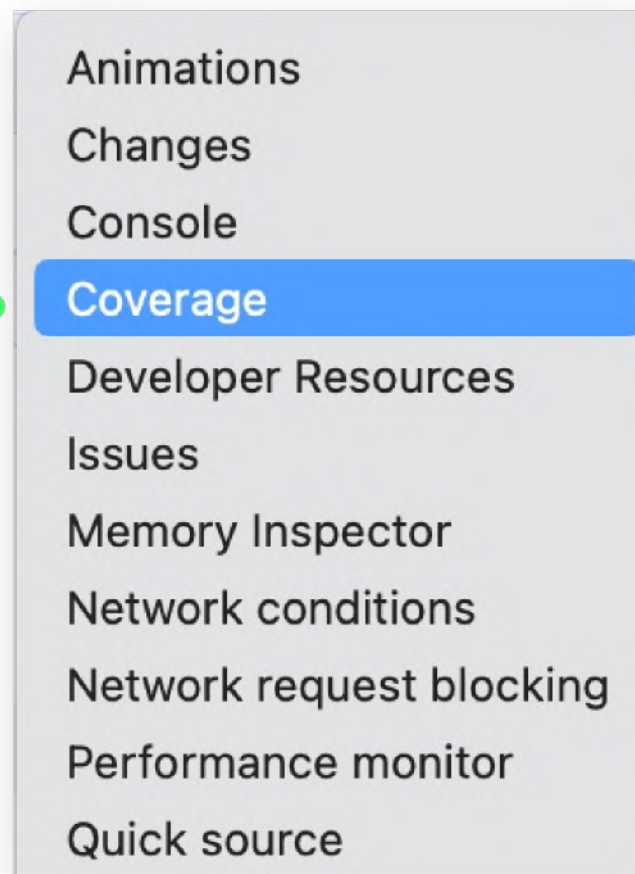
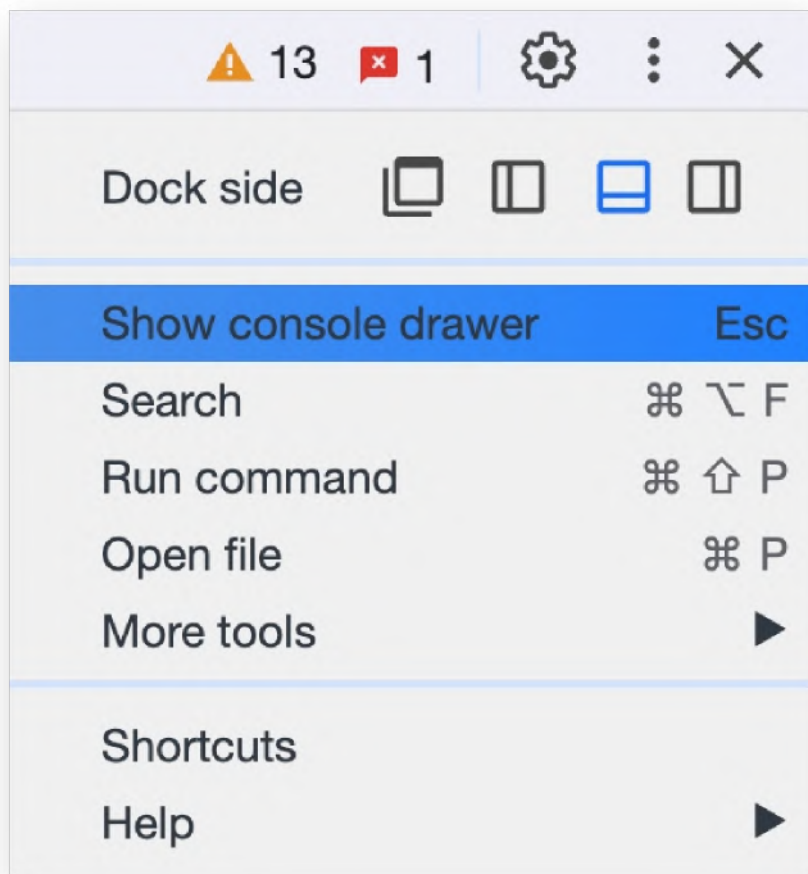


Unused CSS/JS



Unused CSS/JS

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.4ac770b16c740c03c50e84fbd93f1dd9.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%	



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/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.4ac770b16c740c03c50e84fbd93f1dd9.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 Fonts

System

Features

nutzen

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/>

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

**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 License

14.0.0 MIT

Unpacked Size Total Files

1.3 MB 44

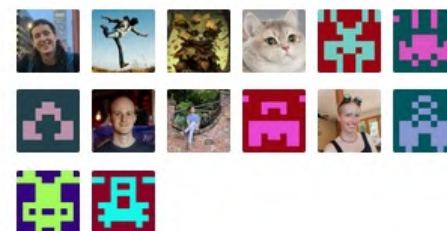
Issues Pull Requests

398 91

Last publish

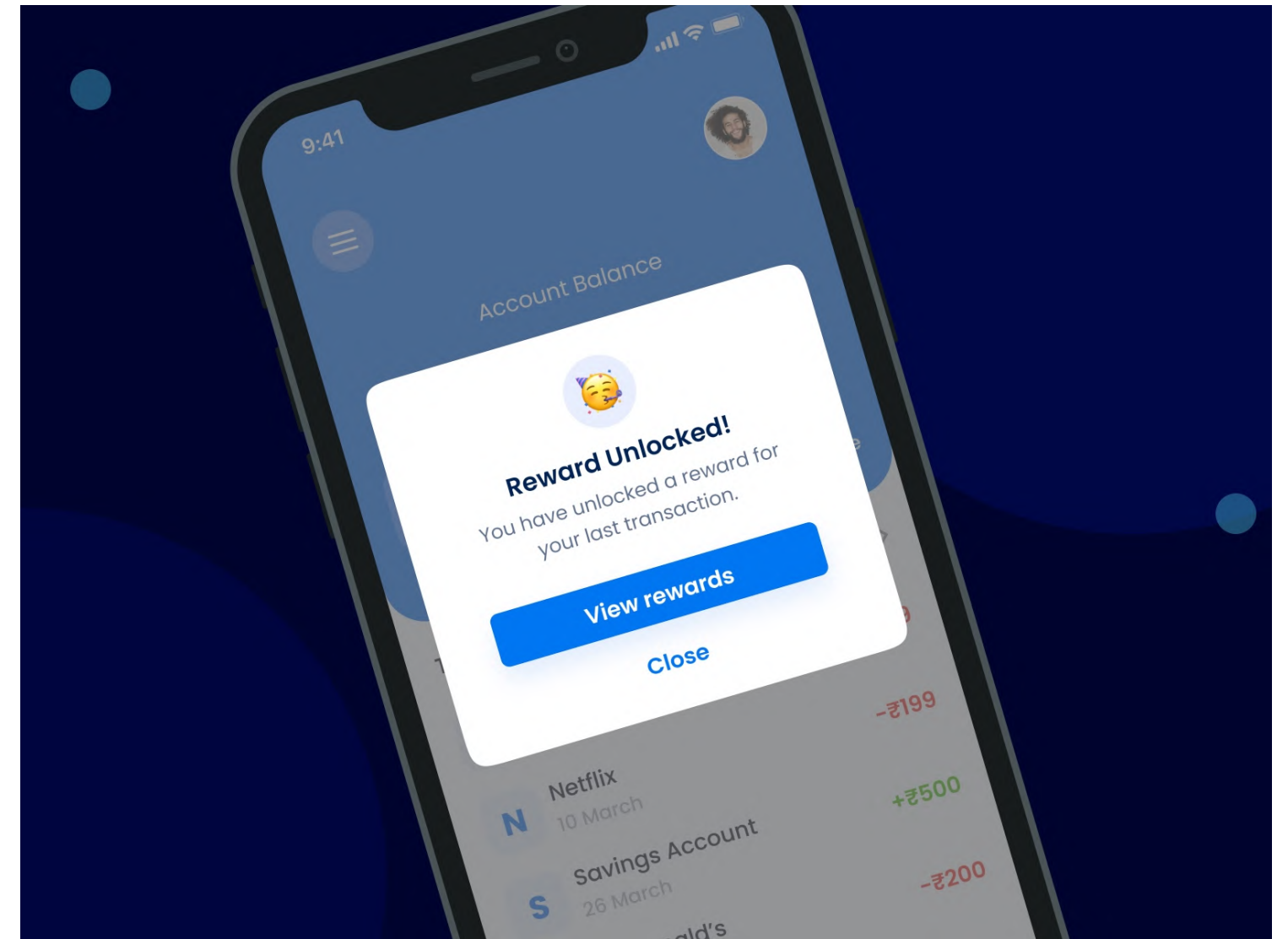
3 days ago

Collaborators



>Try on RunKit

Report malware



Credits: Aishwarya Vijay Kumar auf Dribbble

15 Dependencies 106 Dependents 1.672 Vers

nation, require decisions, or

Install
 > npm i @material/dialog

Repository
 github.com/material-components/

Homepage
 github.com/material-components/

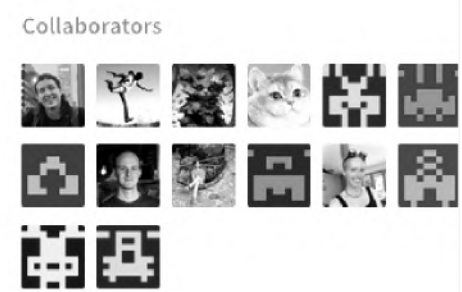
Weekly Downloads
 625.809

Version License
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content to provide critical
 nality when they appear, and
 on has been taken.
 aringly.

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		
4-31			¹ 53-79	10-18	
² 32-36	12-18	3.1-15.3	^{1,4} 80-97	³ 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		

15 Dependencies 106 Dependents 1.672 Vers

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on has been taken.
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tor('.mdc-dialog'));

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github.com/material-compo

Homepage

github.com/material-compo

Weekly Downloads

625.809

Version

14.0.0

Unpacked Size

1.3 MB

Issues

398

Last publish

3 days ago

Collaborators



>Try on RunKit

Report malware

```
<dialog>
```

```
<dialog>
```



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

Dialog element

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		
4-31			1 53-79	10-18	
2 32-36	12-18	3.1-15.3	1 4 80-97	3 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		

Avoid Code:

System

Features

nutzen

System Fonts

Dialog / Modal Feature

Formular Validierung

Formularvalidierung nativ



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

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**

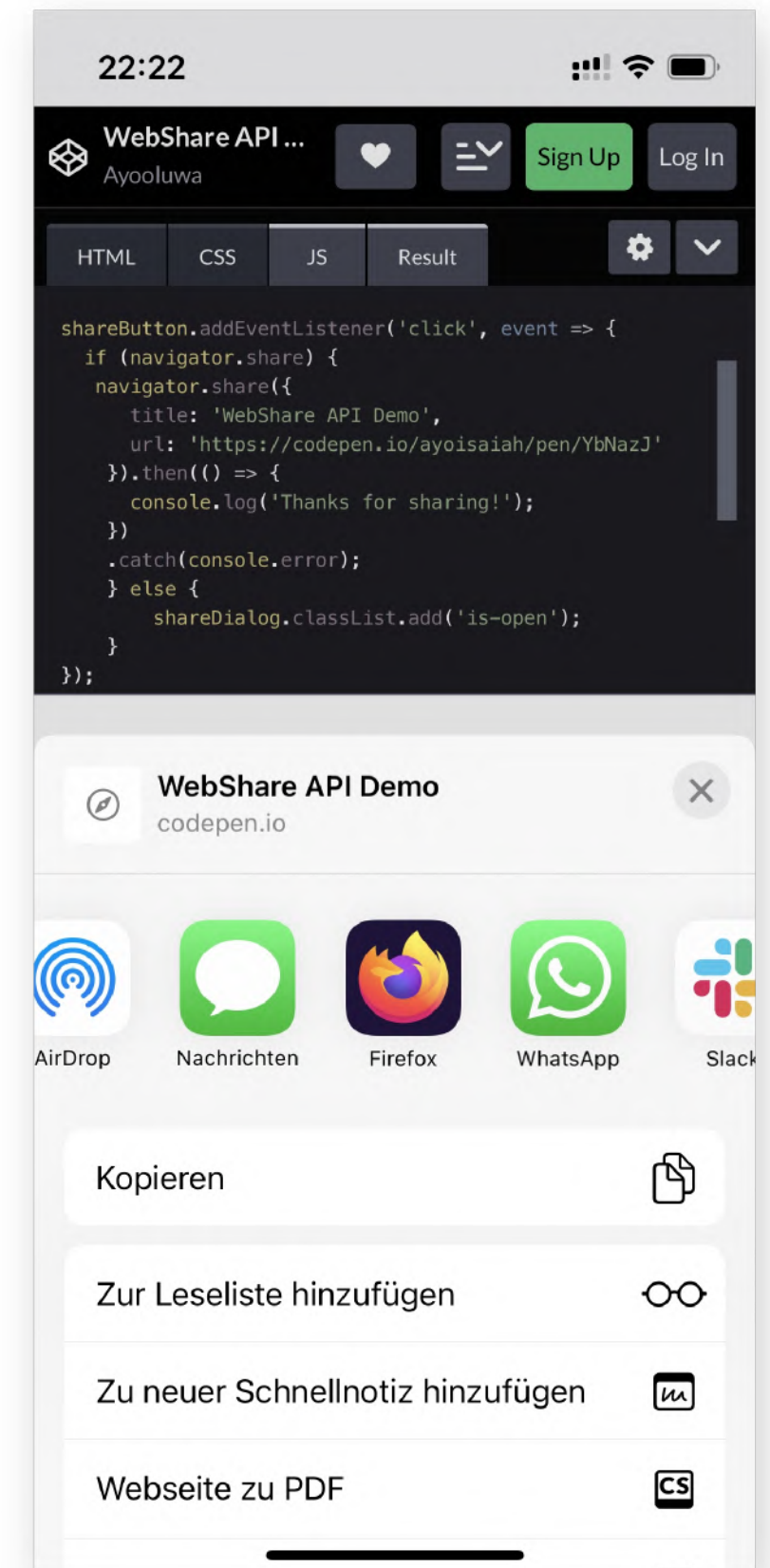
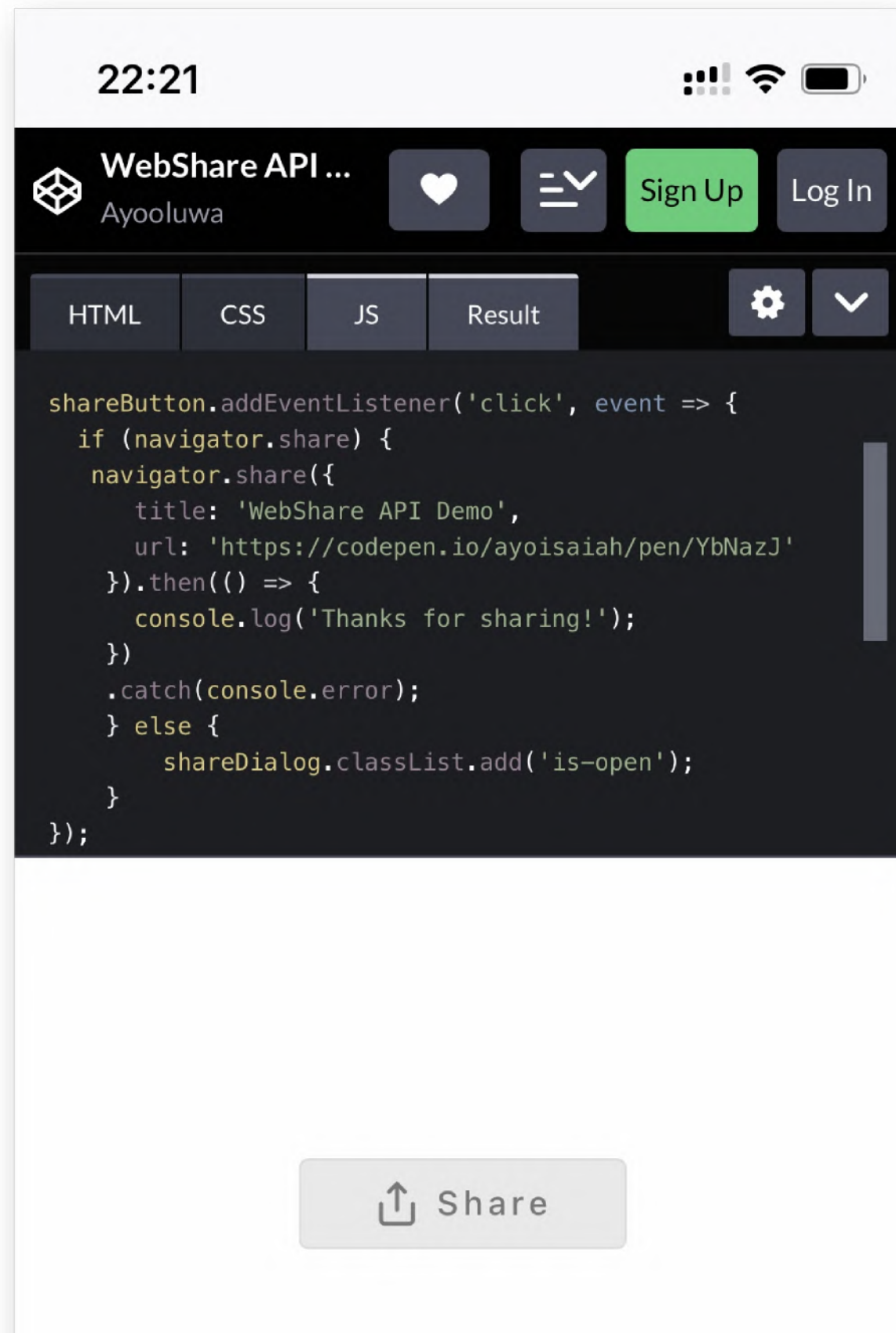
System Fonts

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, ... -->
```

```
<script nomodule src="fallback.js"></script>
```

```
<!-- Babel-Version mit Fallback-Syntax -->
```

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

A

AVOID

Benutzen wir alles?
Brauchen wir alles?

R

REDUCE

Cachen,
Komprimieren,
Minimieren.

O

OPTIMIZE

Ladeverhalten und
Priorisierung

M

MEASURE

Tooling und
Monitoring

A

ATTITUDE

Performance
Culture

Reduce

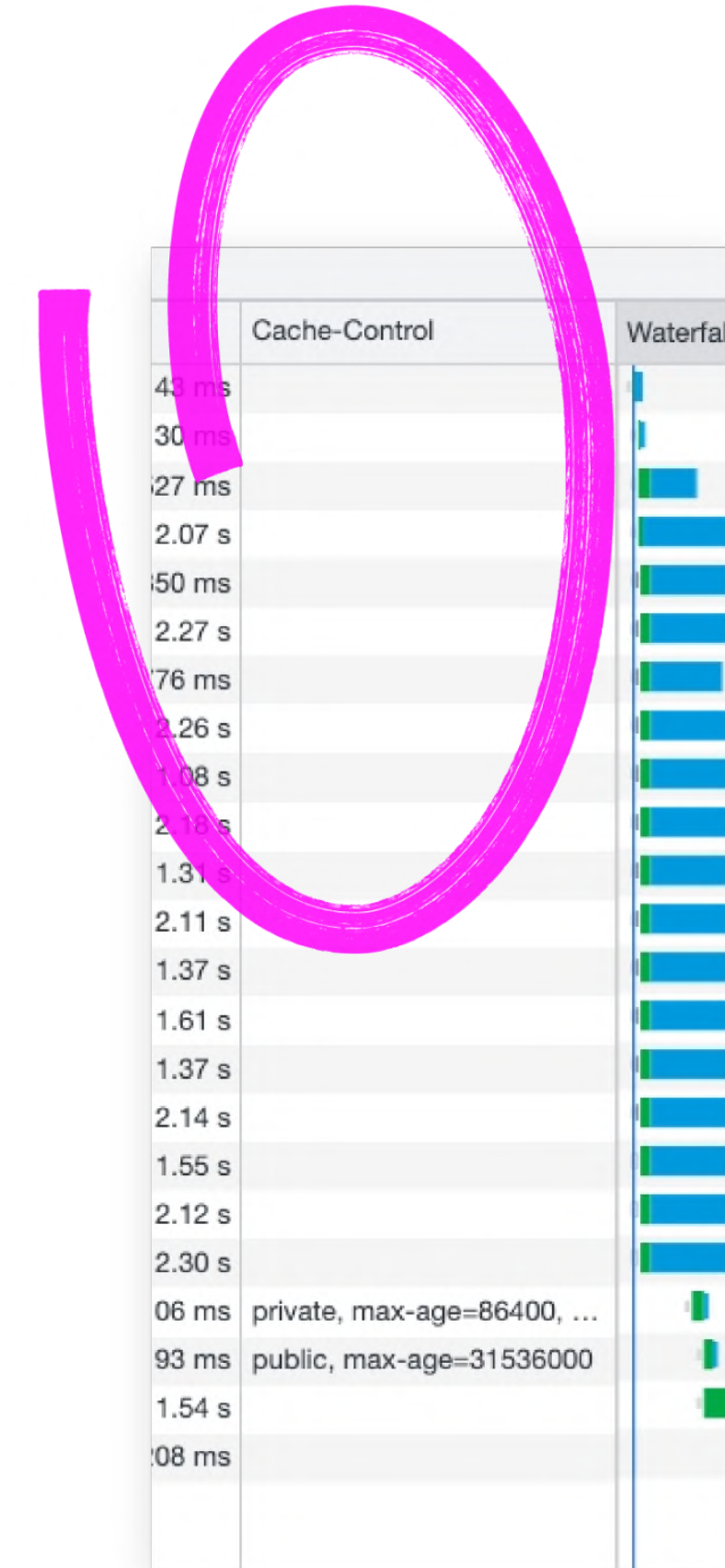


Reduce

Caching

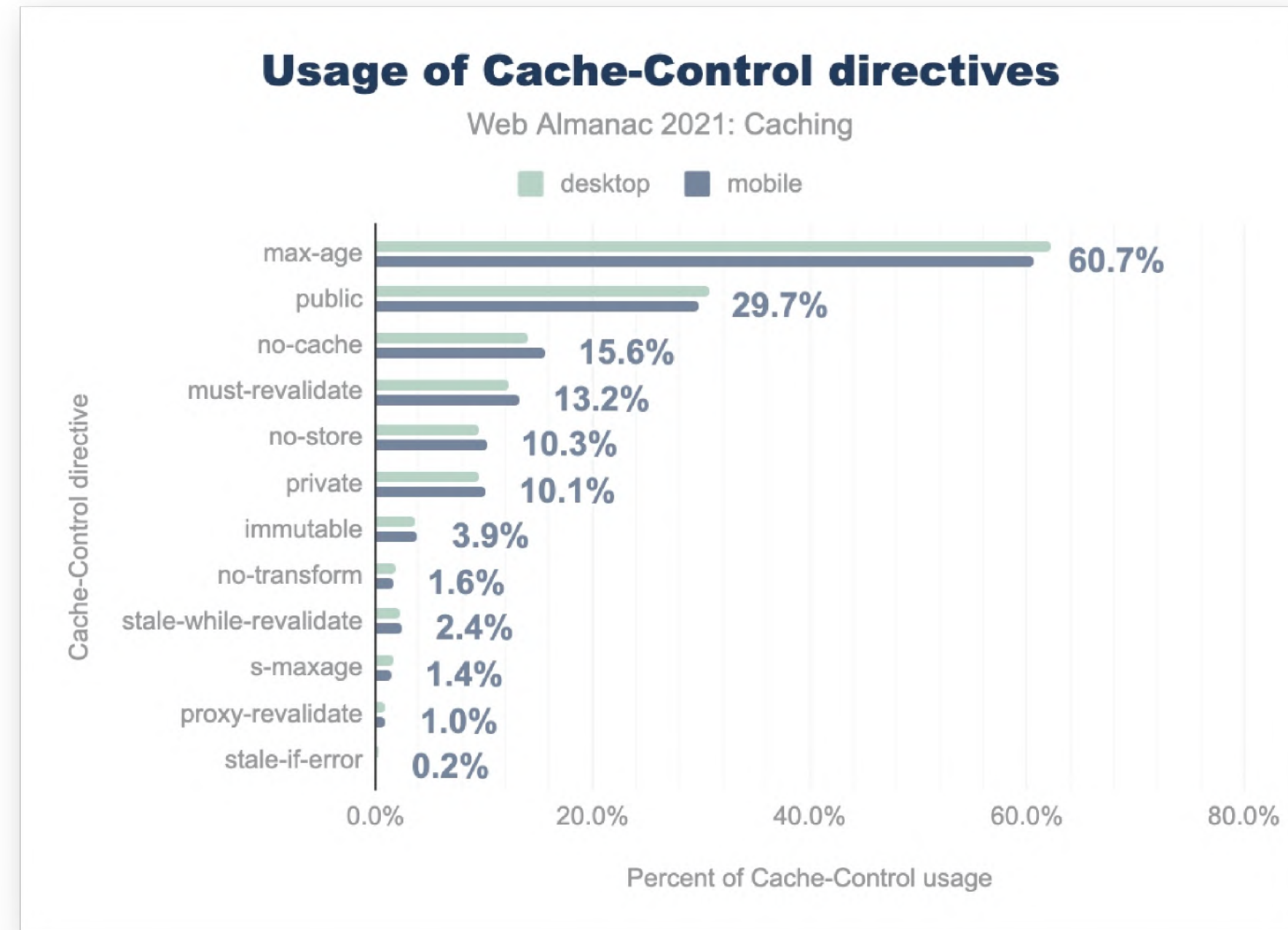
Caching und CDN / Proxy Cache

- 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

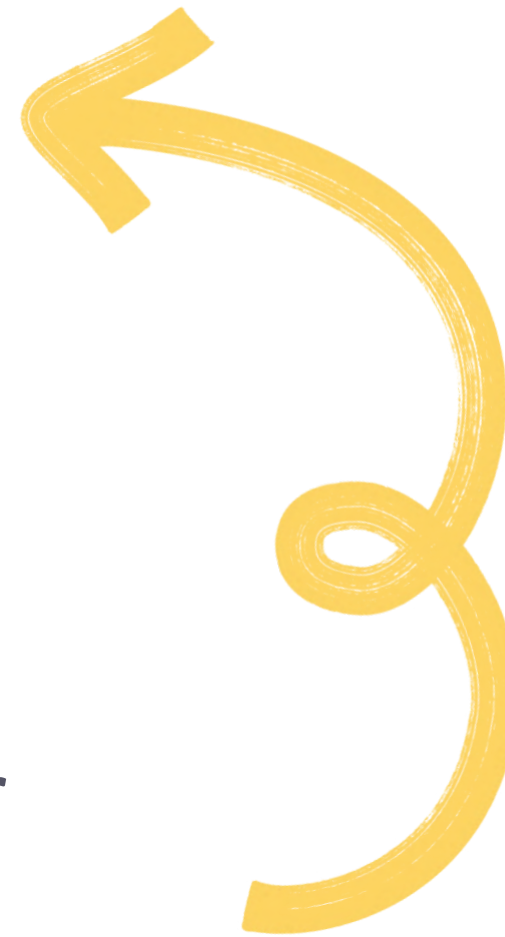
Komprimierung

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

- 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



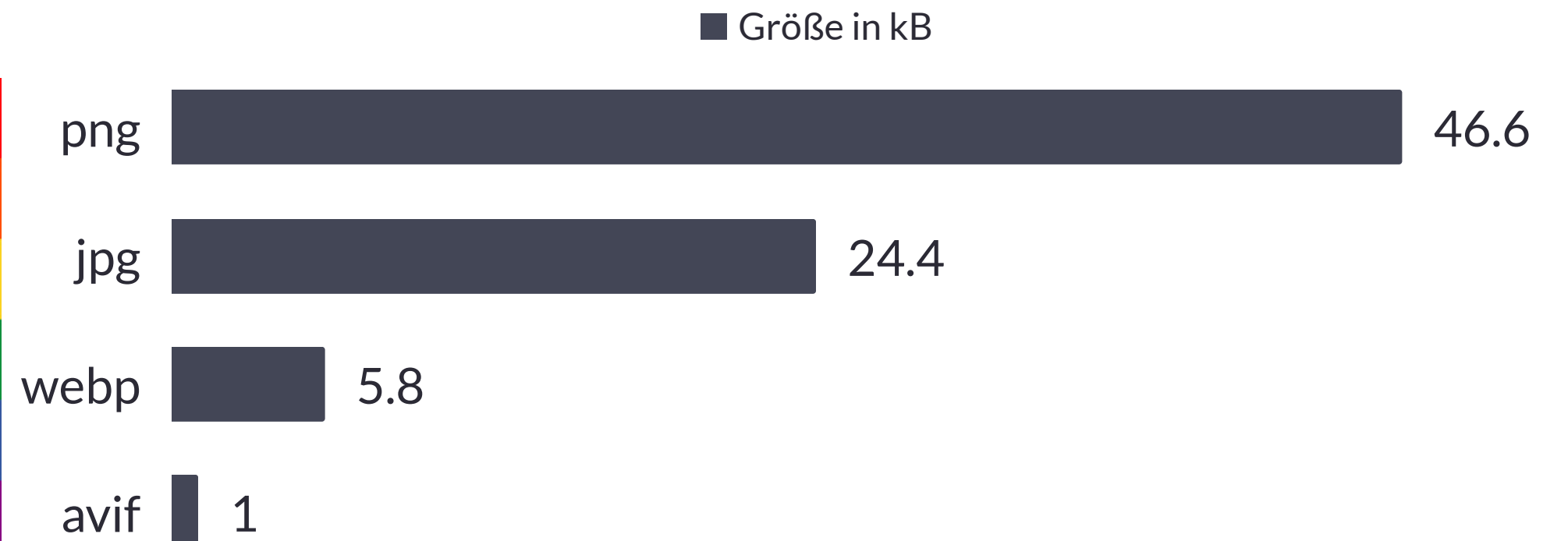
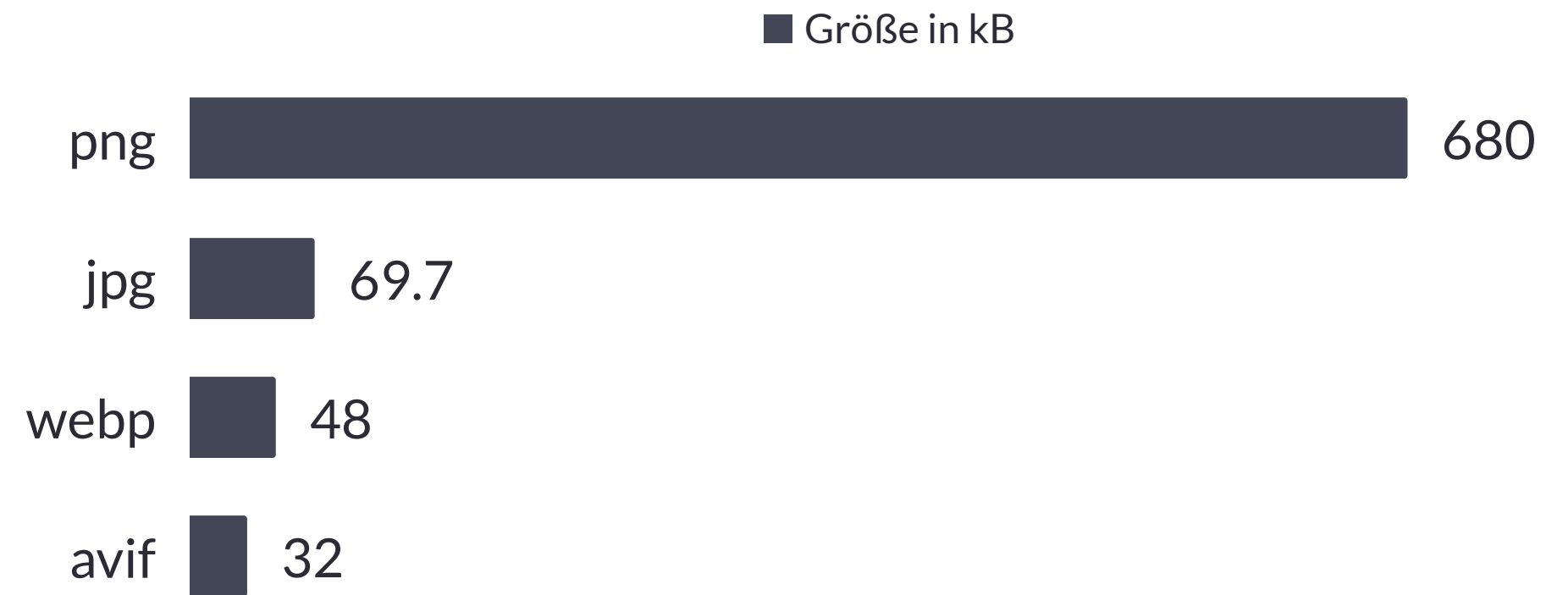
Reduce

Caching

Komprimierung

Bildformate

WebP / Avif : Vorteile



WebP / Avif : Nutzung

WebP image format

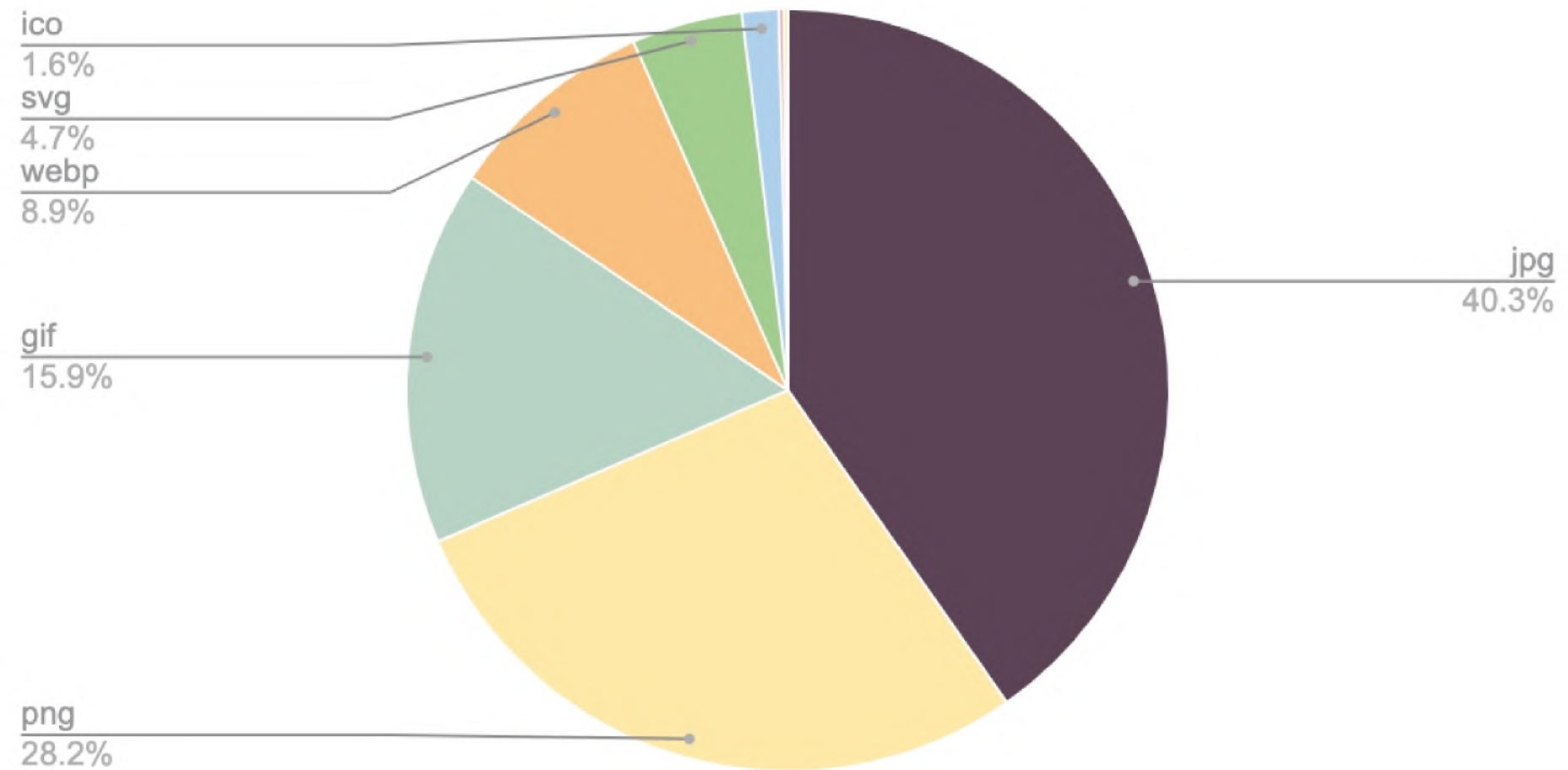
Chrome	Edge *	Safari	Firefox	Opera	IE
4-8				10.1	
¹ 9-22		3.1-13.1		¹ 11.5	
² 23-31	12-17	³ 14-15.6	2-64	² 12.1-18	
32-116	18-116	16.0-16.6	65-117	19-102	6-10
117	117	17.0	118	103	11
118-120		17.1-TP	119-121		

AVIF image format

Chrome	Edge *	Safari	Firefox	Opera	IE
			2-76		
			¹ 77-92		
		3.1-16.0	² 93-110		
4-84	12-113	^{2 3 4} 16.1-16.3	⁵ 111-112	10-70	
85-116	⁶ 114-116	16.4-16.6	113-117	71-102	6-10
117	⁶ 117	17.0	118	103	11
118-120		17.1-TP	119-121		

Image format adoption

Web Almanac 2022: Media (mobile)



WebP / Avif : Wettbewerbsvorteil!

WebP image format

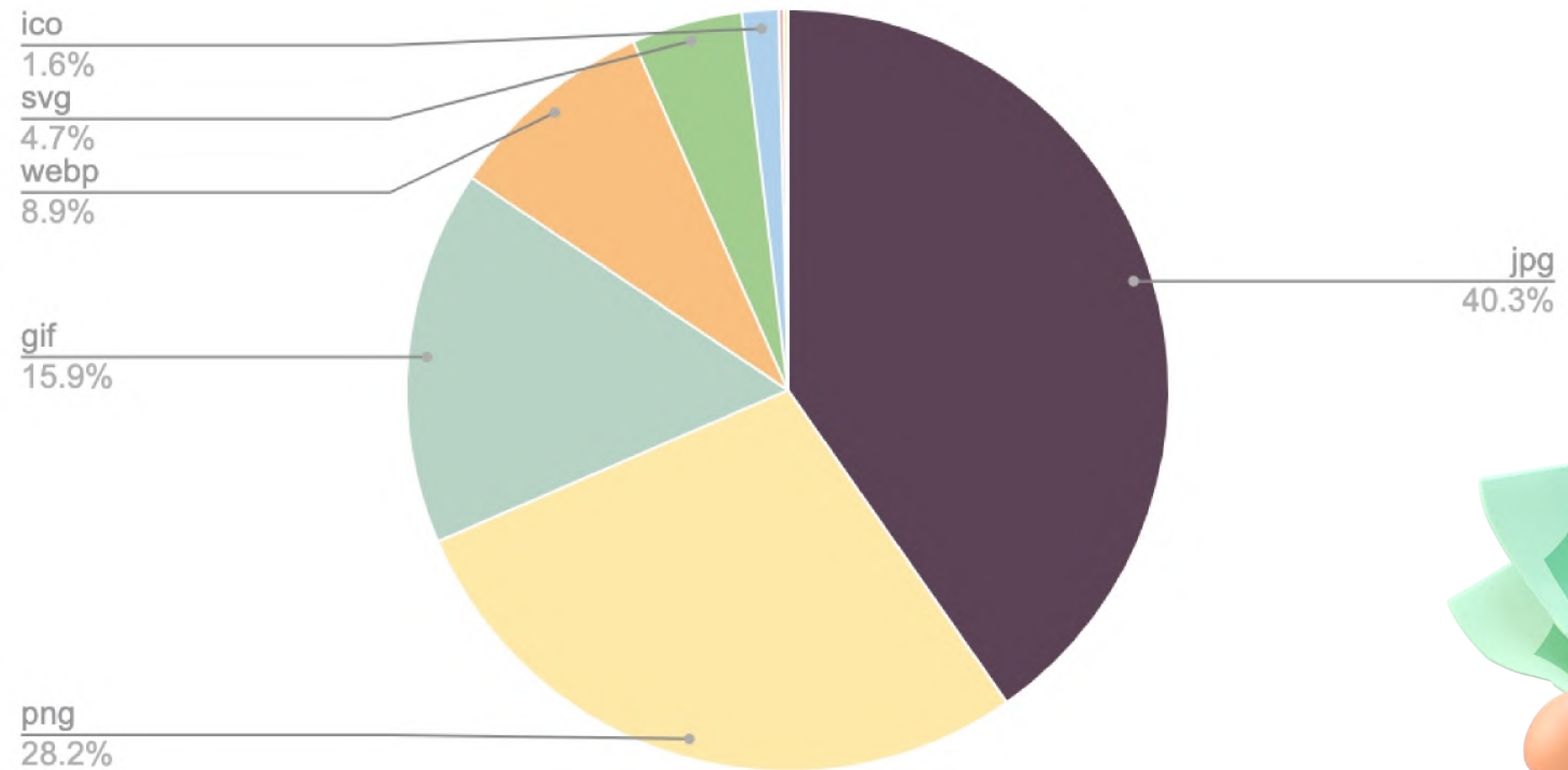
Chrome	Edge *	Safari	Firefox	Opera	IE
4-8				10.1	
¹ 9-22		3.1-13.1		¹ 11.5	
² 23-31	12-17	³ 14-15.6	2-64	² 12.1-18	
32-116	18-116	16.0-16.6	65-117	19-102	6-10
117	117	17.0	118	103	11
118-120		17.1-TP	119-121		

AVIF image format

Chrome	Edge *	Safari	Firefox	Opera	IE
			2-76		
			¹ 77-92		
		3.1-16.0	² 93-110		
4-84	12-113	^{2 3 4} 16.1-16.3	⁵ 111-112	10-70	
85-116	⁶ 114-116	16.4-16.6	113-117	71-102	6-10
117	⁶ 117	17.0	118	103	11
118-120		17.1-TP	119-121		

Image format adoption

Web Almanac 2022: Media (mobile)



WebP / Avif : Einsatz



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.

■ 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
 i m g ...png/event-funeral.png (lama.thomaspuppe.de)	302.3 KiB	232.4 KiB

websppeedtest.cloudinary.com

B blog-both.jpg


JPEG 66.8 KB Current

Potential Smart Compression

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

[SEE DETAILS](#)

Image format options with file size and % compared to current

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

Bildkomprimierung: ...



Bildkomprimierung: SVG!



- [SVGOptimize](#)
- [SVGOMG](#)

Reduce

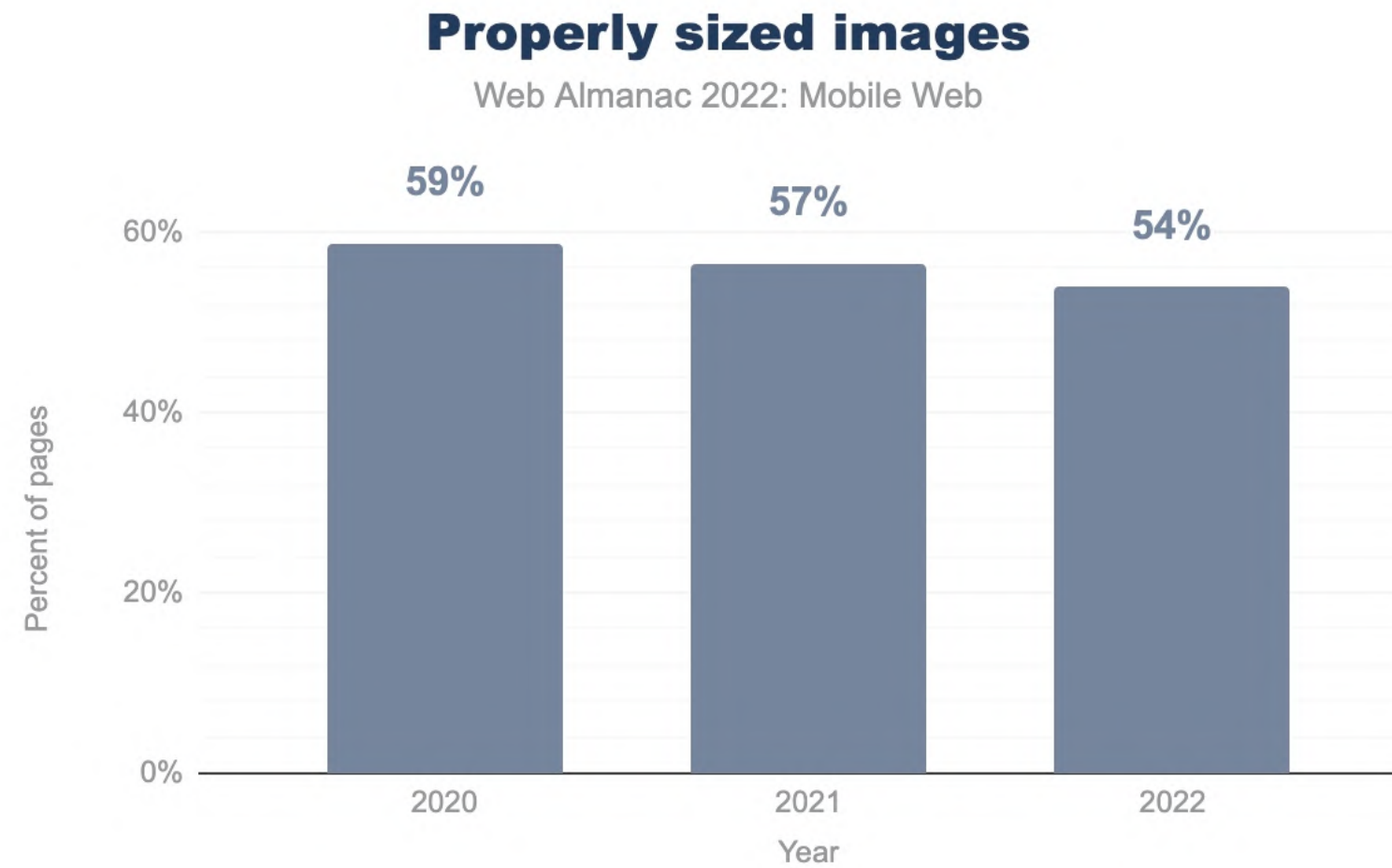
Caching

Komprimierung

Bildformate

Responsive Images

Responsive Images

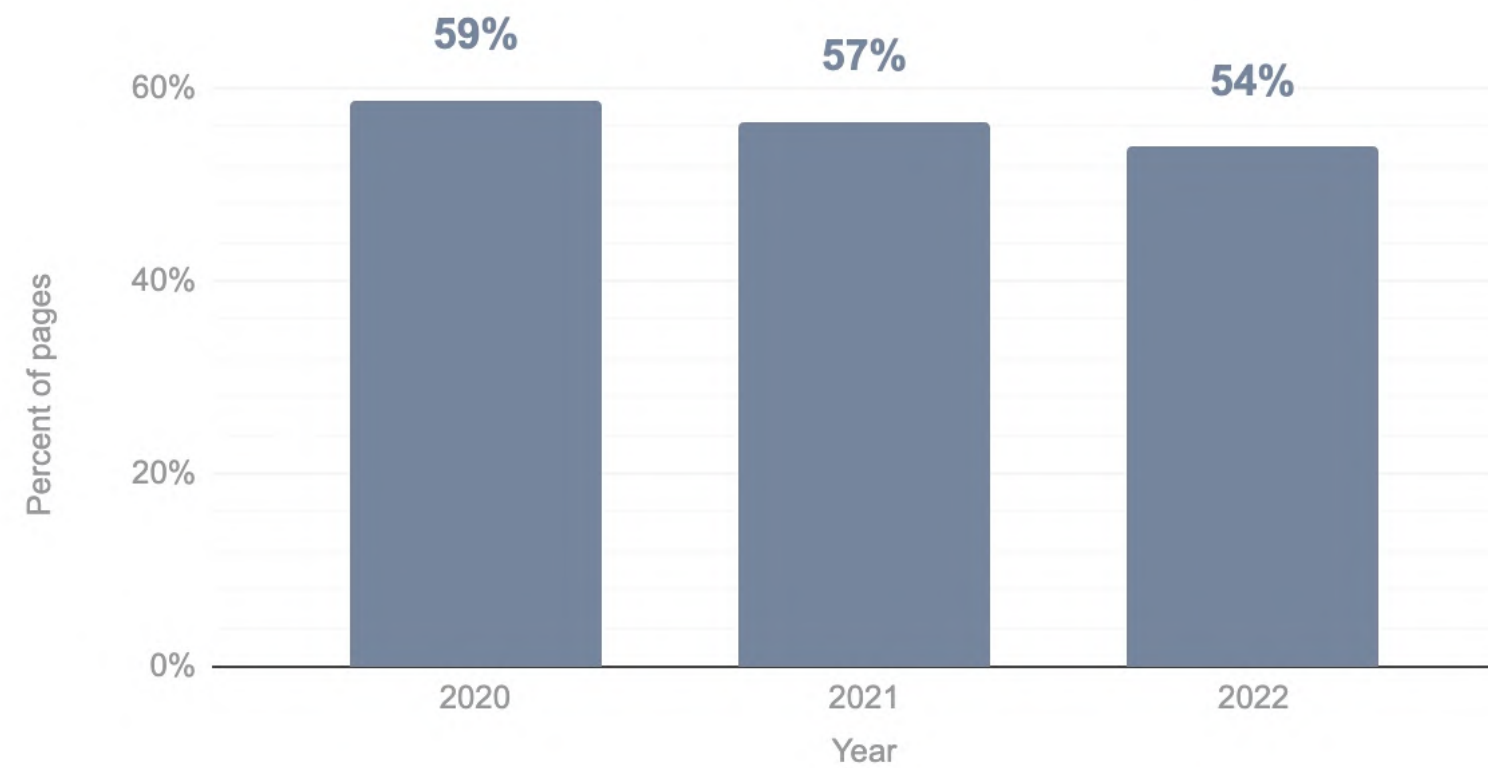


Credit: httparchive.org

Responsive Images

Properly sized images

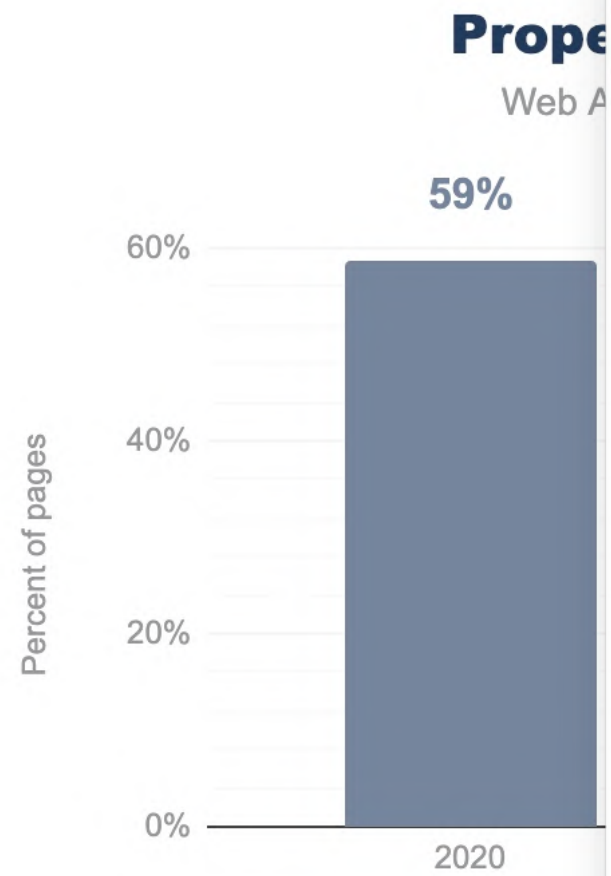
Web Almanac 2022: Mobile Web



Credit: httparchive.org



Responsive Images



Credit: httparchive.org

Responsive Images



Prope
Web A
59%




Responsive Images checken

Gelegenheit! </h2>

▼ <div class="...">

- ▶ <a>
- ▶ <a>
- ▶ <a>
- ▶ <a>
- ▶ <a>
- ▶ <a>
- ▼ <a>

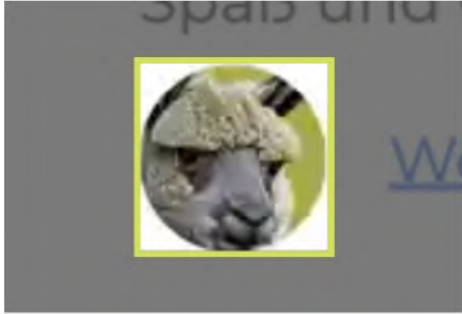


Rendered size: 60 × 60 px
Rendered aspect ratio: 1:1
Intrinsic size: 512 × 512 px
Intrinsic aspect ratio: 1:1
File size: 523 kB
Current source: https://lama.thomaspuppe.de/images_unoptimized/png/avatar7.png

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>


SEO TOOLS

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

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

Responsive Image

Serve images larger than the user's viewport

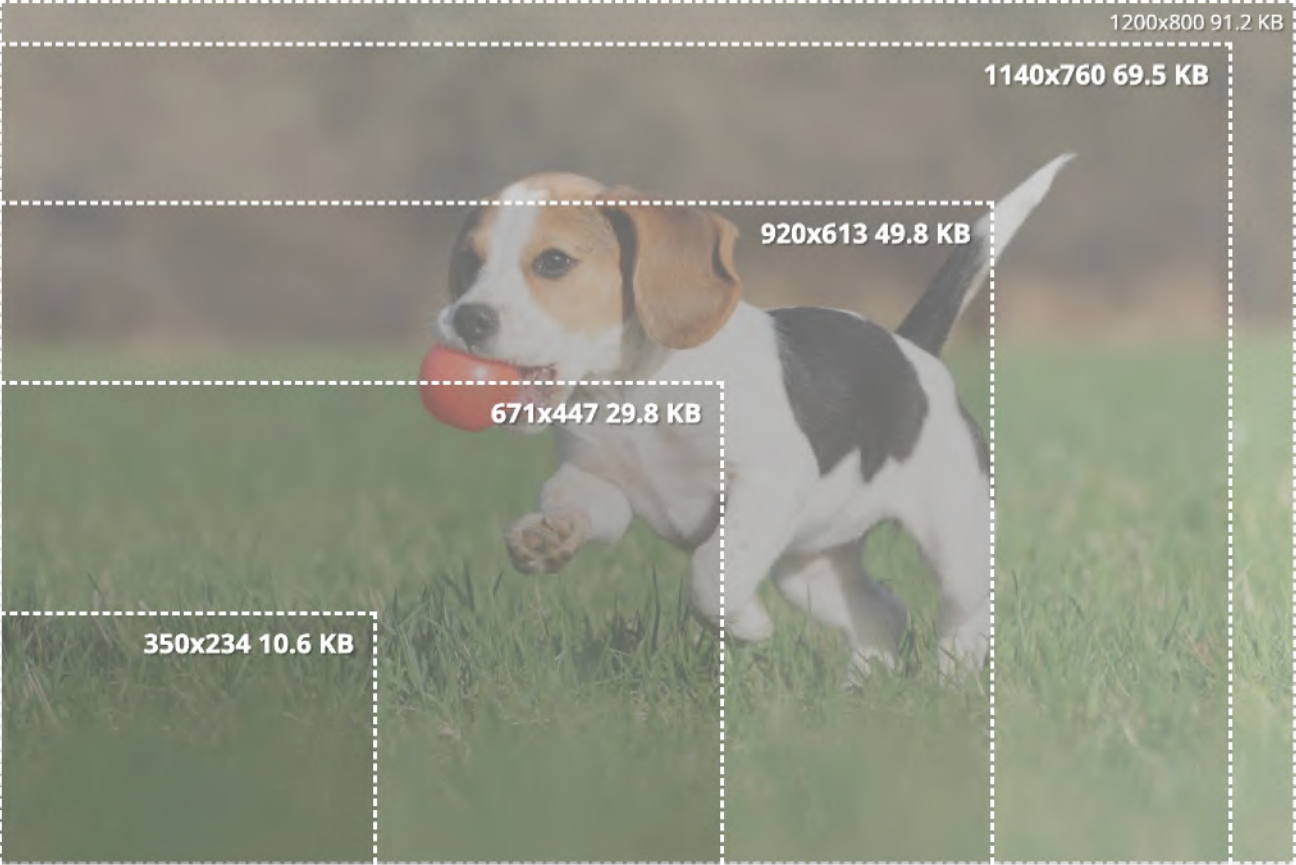
Preview	Display Size	Natural Size
	397x224	1000x566

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



<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:

websitespeedtest.cloudinary.com

Responsive Images checken:

toolsaday.com/seo/responsive-image-checker

hands-on



Credit: Pitch Sticker "Cyberpunk"

Reduce

Caching

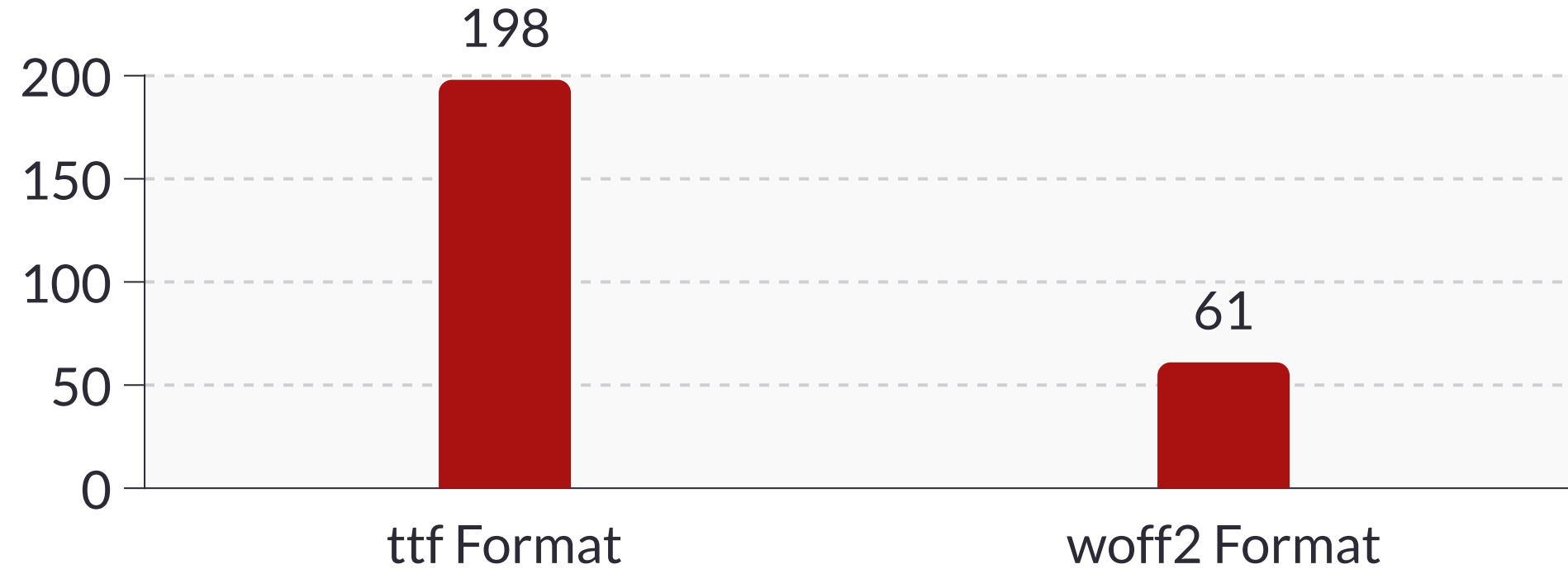
Komprimierung

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**.

Characters

969

Glyphs

1909

Layout features

24

Languages

50

Filename

Montserrat-Regular.woff2

Size

60 KB

Format

WOFF2

Designed by

Julieta Ulanovsky

Manufactured by

Julieta Ulanovsky

Copyright

Copyright 2011 The Montserrat Project Authors (<https://github.com/JulietaUla/Montserrat>)

Version

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>

Language support

50 languages: Afrikaans, Albanian, Azerbaijani, Basque, Belarusian, Bosnian, Bulgarian, Catalan, Croatian, Czech, Danish, Dutch, English, Estonian, Faroese, Filipino, Finnish, French, Galician, German, Hungarian, Icelandic, Indonesian, Irish, Italian, Kazakh, Kyrgyz, Latvian, Lithuanian, Macedonian, Malay, Mongolian, Norwegian Bokmål, Polish, Portuguese, Romanian, Russian, Serbian, Slovak, Slovenian, Spanish, Swahili, Swedish, Tongan, Turkish, Ukrainian, Uzbek, Vietnamese, Welsh, Zulu

Wakamai Fondue might fail to detect some languages. I'm working on a better system—stay tuned!

Layout features

aalt c2sc case ccmp dlig dnom frac liga lnum locl numr onum ordn pnum salt sinf smcp ss01 subs sups
tnum kern mark mkmk

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**.

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Version

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>

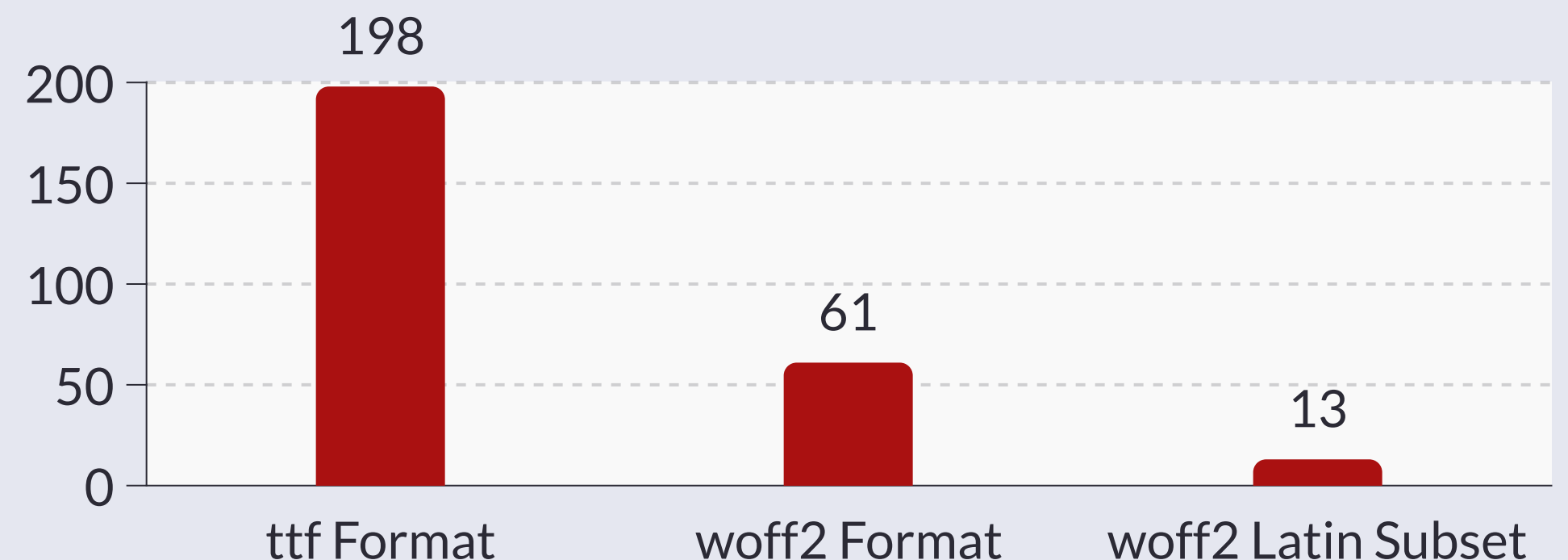
Language support

50 languages:
Estonian, Faroese,
Macedonian, Malay,
Swedish, Tongan

Wakamai Fondue

Layout features

aalt c2sc
tnum kern



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

AVOID

Benutzen wir alles?
Brauchen wir alles?

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Cachen,
Komprimieren,
Minimieren.

O

OPTIMIZE

Ladeverhalten und
Priorisierung

M

MEASURE

Tooling und
Monitoring

A

ATTITUDE

Performance
Culture

Pause



Credit: Pitch Sticker "Cyberpunk"

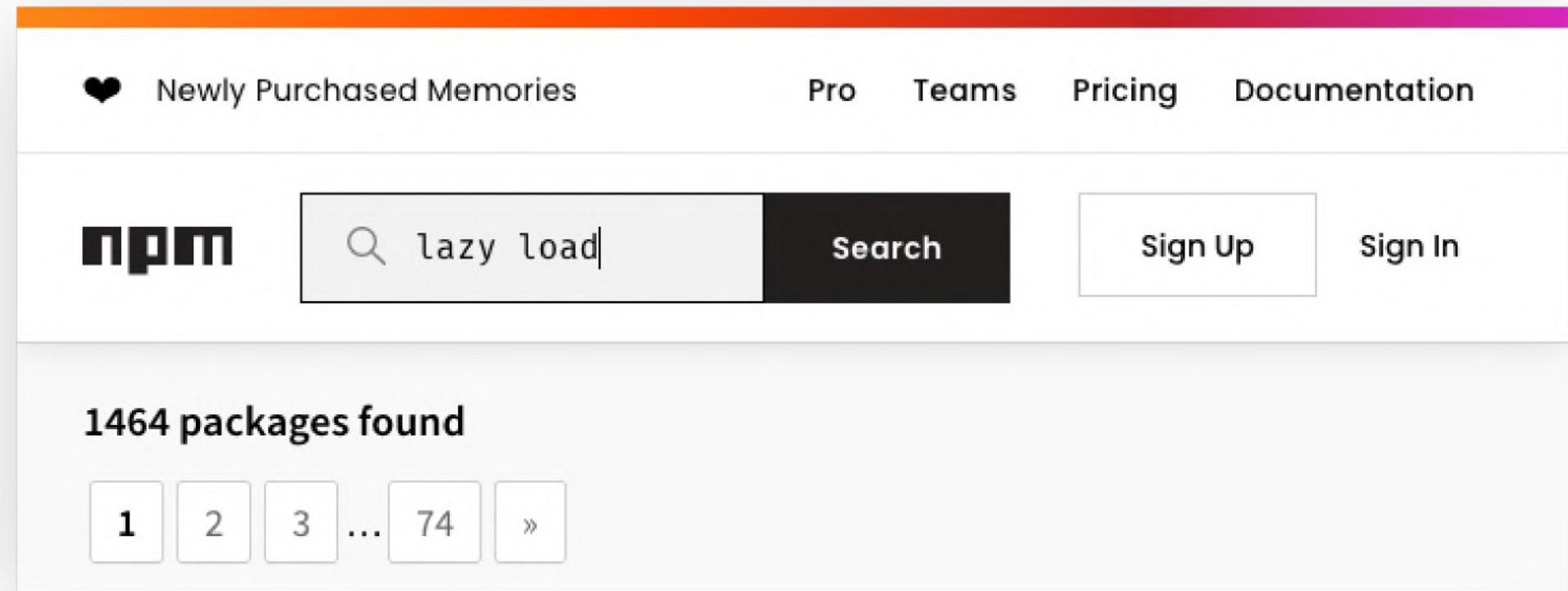


Optimize

Optimize

Lazy Loading

Lazy Loading



The screenshot shows the top navigation bar of the npm website with links for 'Newly Purchased Memories', 'Pro', 'Teams', 'Pricing', and 'Documentation'. Below the navigation is the npm logo, a search bar containing the text 'lazy load', and buttons for 'Search', 'Sign Up', and 'Sign In'. Below the search bar, it indicates '1464 packages found' and provides a pagination control showing page 1 of 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

```

```

Error Element `img` is missing required attribute `src`.

From line 72, column 17; to line 72, column 69

```

```

```
const images = document.querySelectorAll('img[data-src]');
const options = { rootMargin: '0px', threshold: 0.5 };
const observer = new IntersectionObserver((entries, observer) => {
  entries.forEach(entry => {
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      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

```

```

Error Element `img` is missing required attribute `src`.

From line 72, column 17; to line 72, column 69

```

```

auf JavaScript angewiesen

```
const images = document.querySelectorAll('img[data-src]');
const options = { rootMargin: '0px', threshold: 0.5 };
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  entries.forEach(entry => {
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      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

```

```

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?

```
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:



```

```

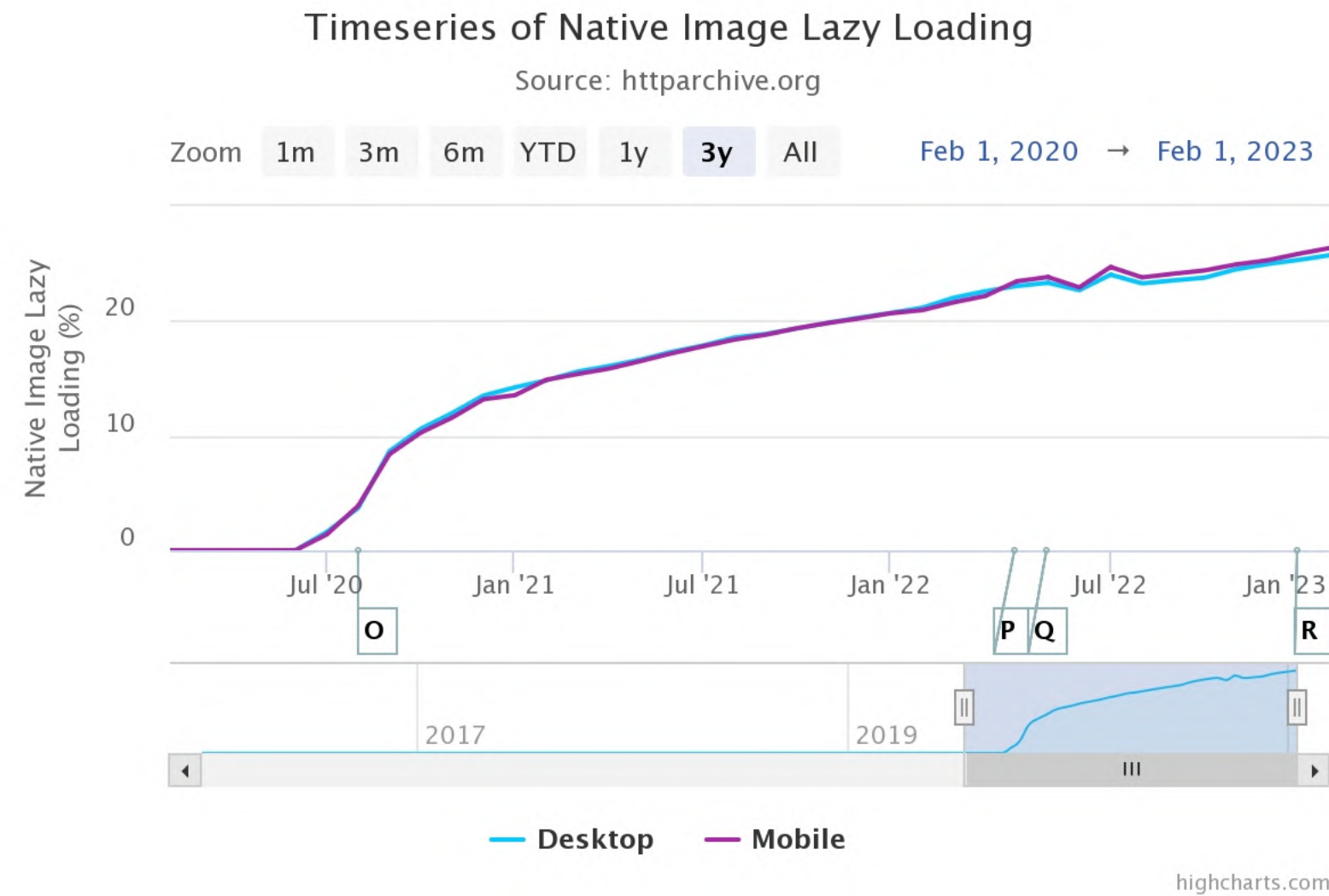


```
<iframe src="datawrapper.html" loading="lazy" >
```



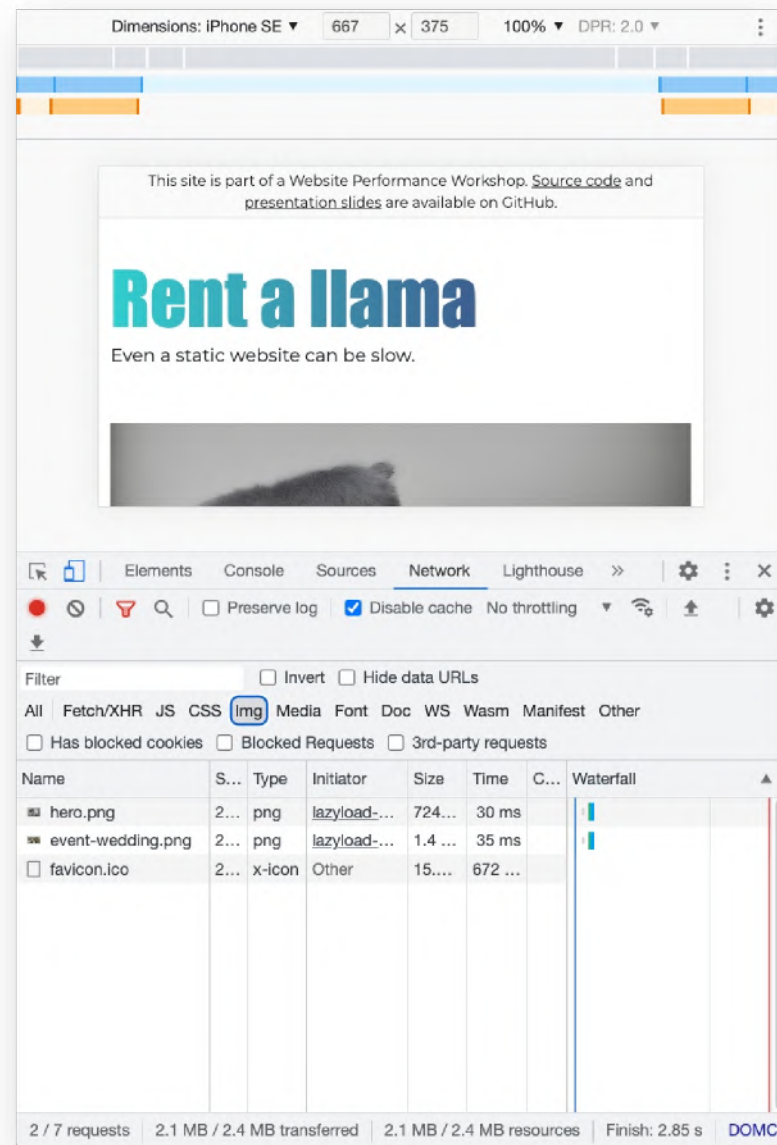
loading=lazy

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

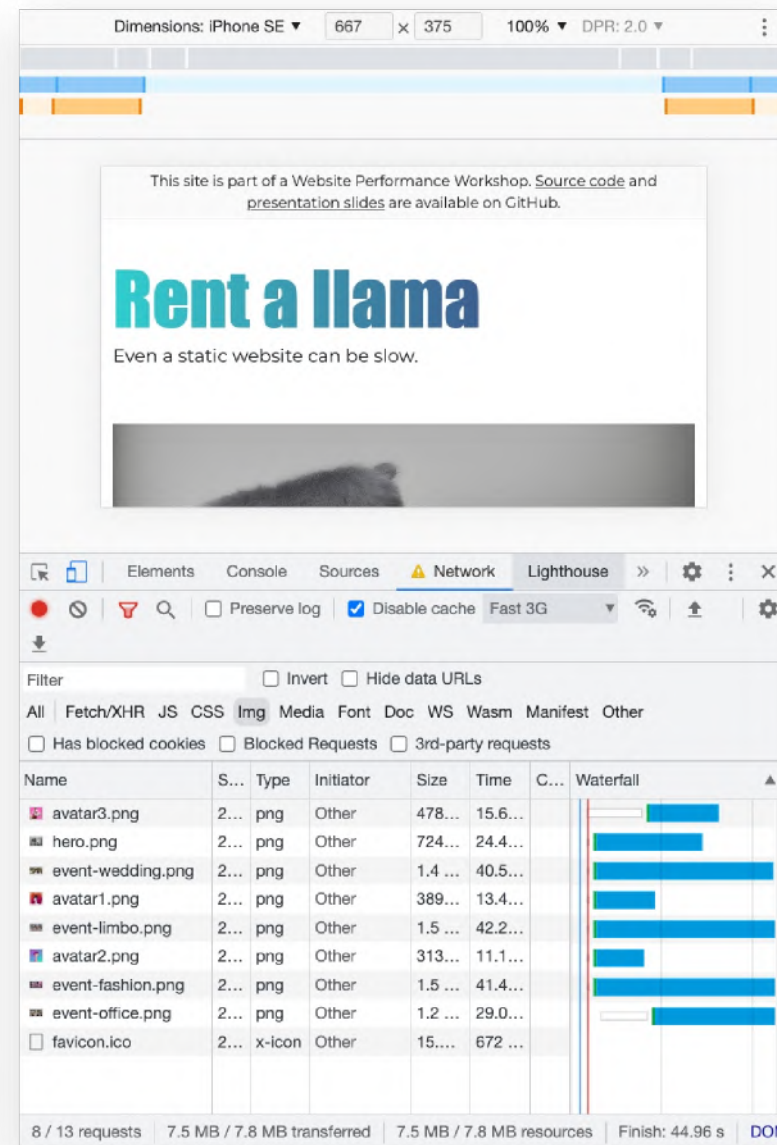


Credit: <https://httparchive.org/reports/state-of-images#imgLazy>.

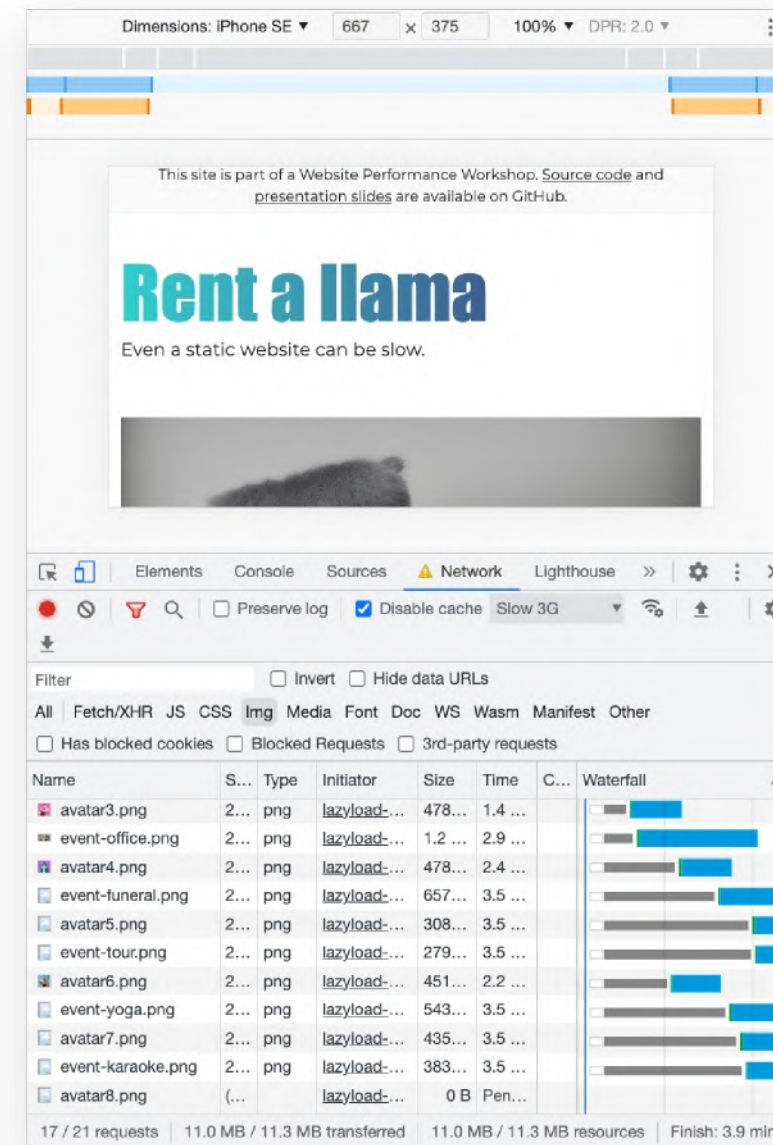
Lazy Loading nativ



kein Throttling: 2 Bilder

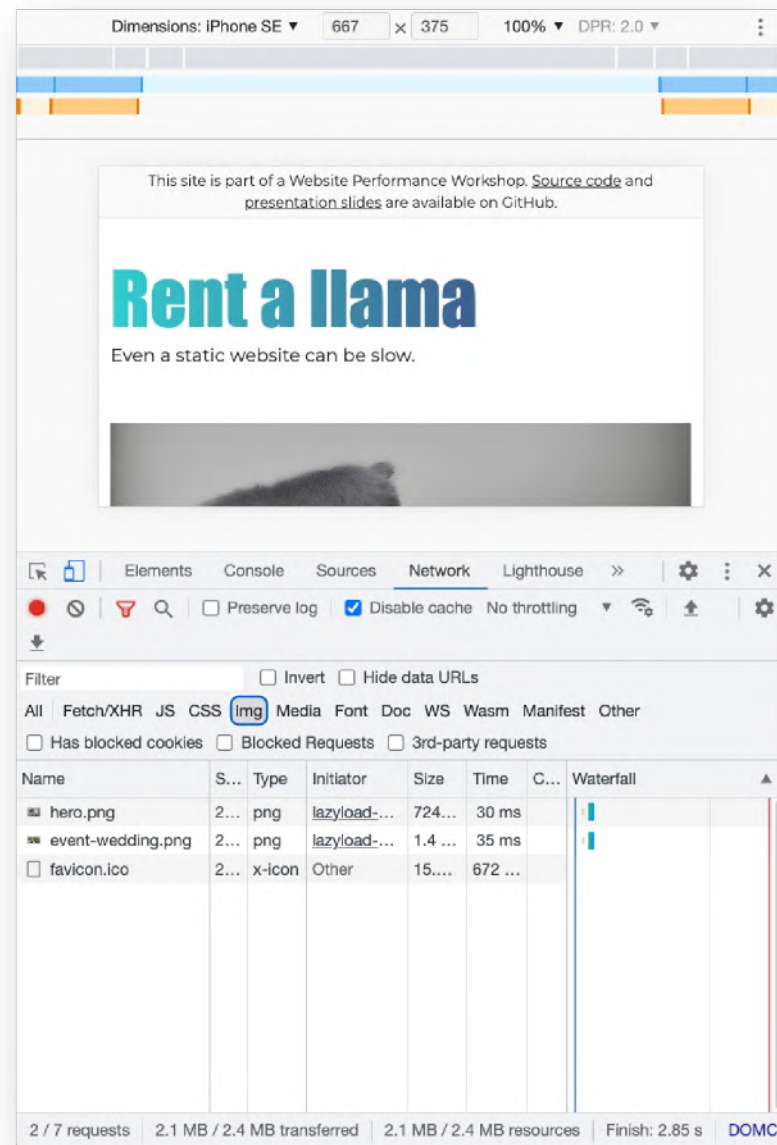


fast 3G: 7 Bilder

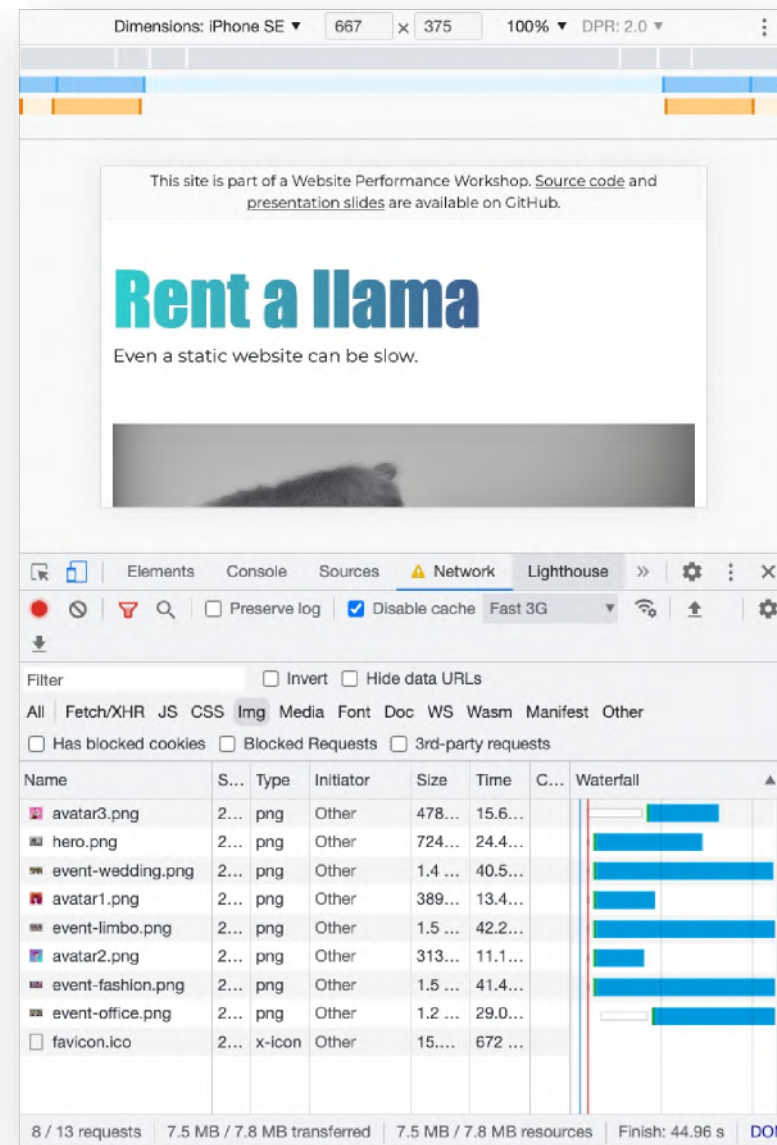


slow 3G: 16 Bilder

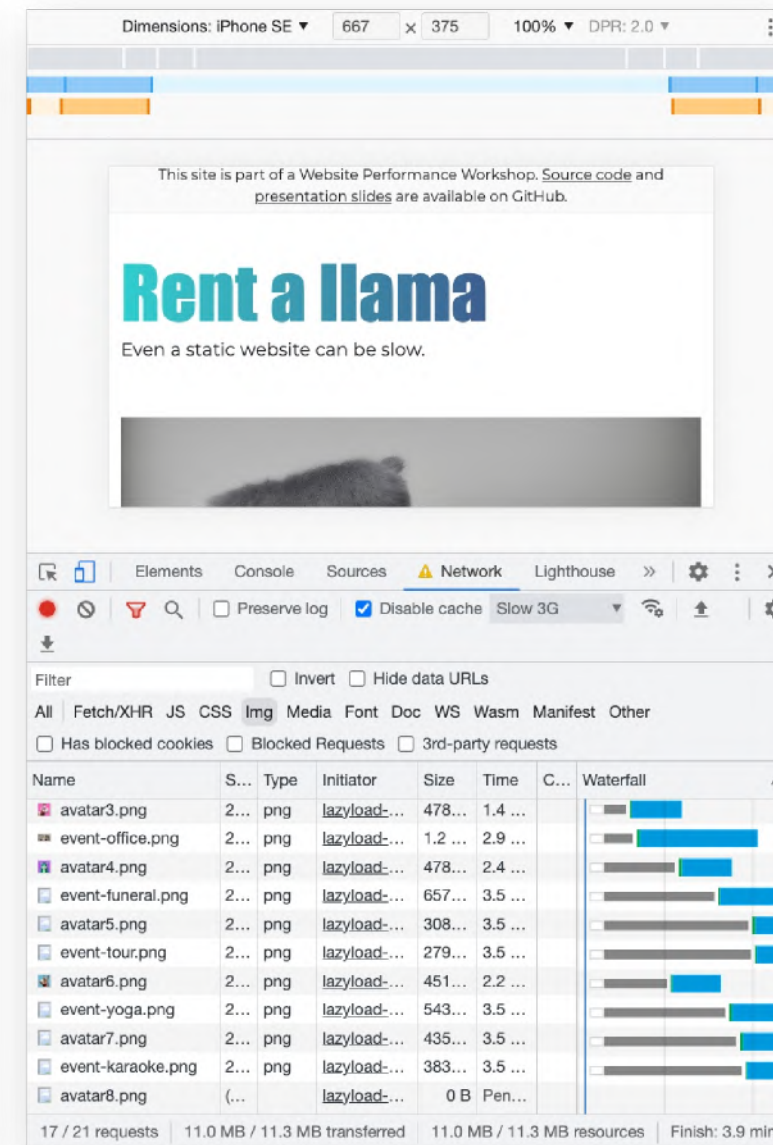
Lazy Loading nativ



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.

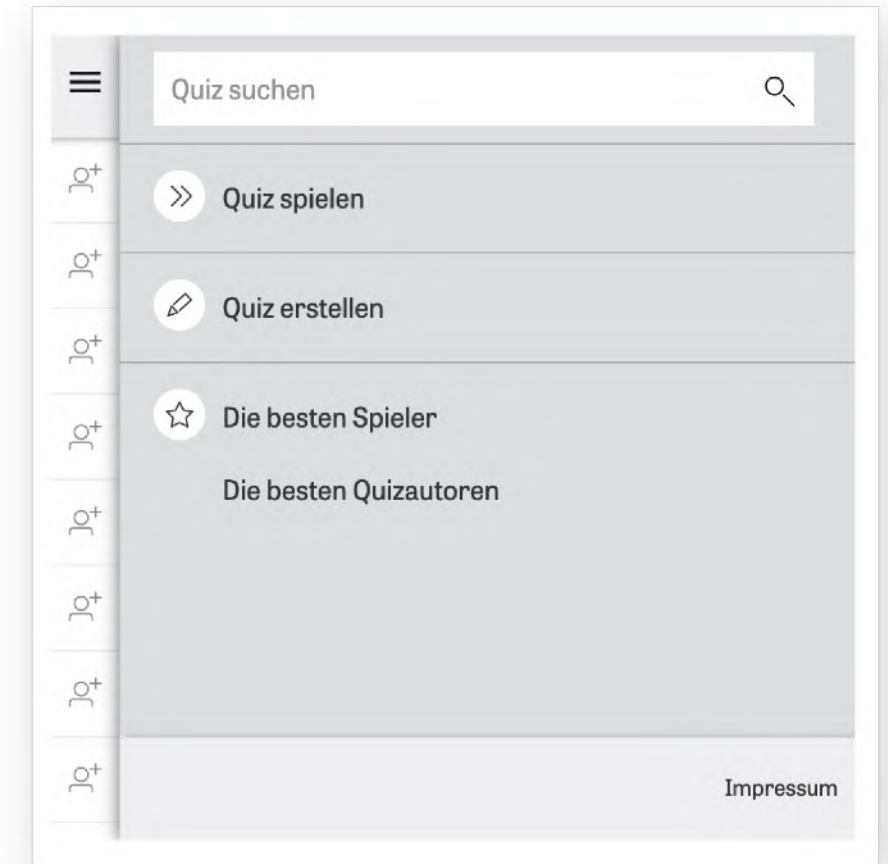
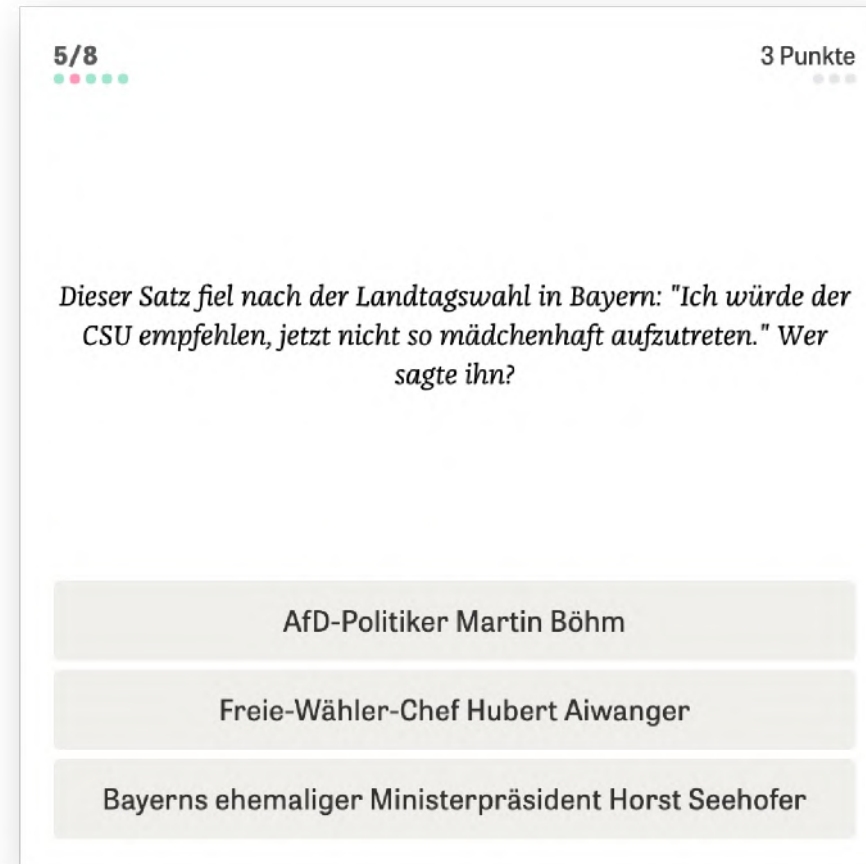
Zum Beispiel wird *mehr* vorgeladen, wenn die Internetverbindung langsam ist!

Optimize

Lazy Loading

Fassaden

Fassaden



Fassaden



Bombenanschlag in Ankara

PKK soll sich zu Anschlag in Ankara bekannt haben

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

Wortiger
Das beliebte Worträtsel jetzt auch auf ZEIT ONLINE:
Finden Sie in 6 Versuchen das richtige Wort.

STARTEN

QUIZ

Wissenstest des Tages

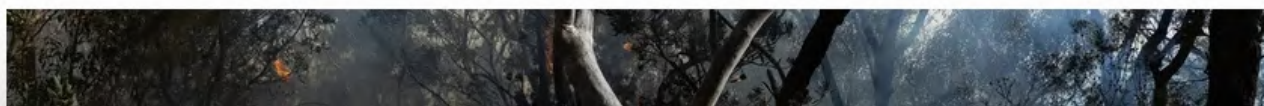
Von ZEIT ONLINE
01. Oktober 2023

SPIELEN

Gesellschaft [Letzte Generation](#) • [Rechtsextremismus](#) • [Extremwetter](#)

Australien

Behörden ordnen wegen Buschbränden Evakuierungen an




Fassaden



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STARTEN

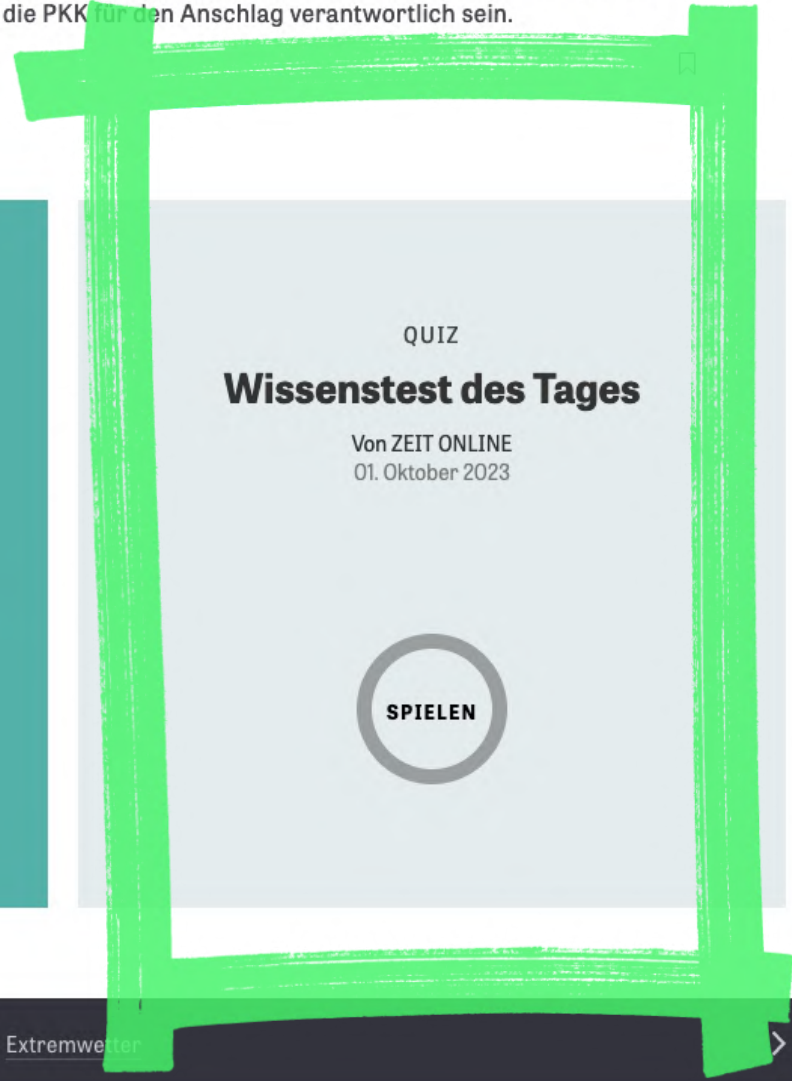
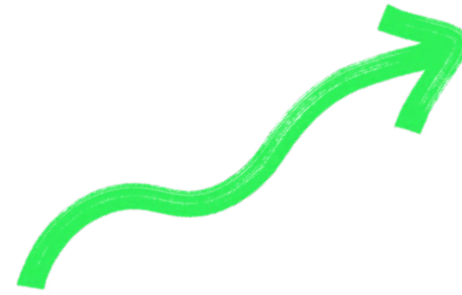
QUIZ

Wissenstest des Tages

Von ZEIT ONLINE
01. Oktober 2023

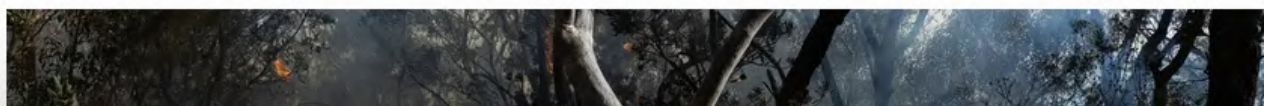
SPIELEN

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



Australien

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Fassaden



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STARTEN

5/9 3 Punkte

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

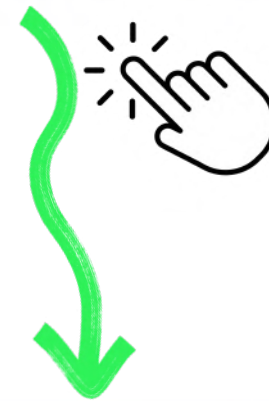
- AfD-Politiker Martin Böhm
- Freie-Wähler-Chef Hubert Aiwanger
- Bayerns ehemaliger Ministerpräsident Horst Seehofer

Australien

Behörden ordnen wegen Buschbränden Evakuierungen an



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	782 B	43 B

Fassaden



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STARTEN

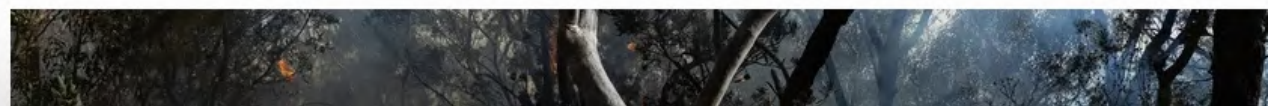
QUIZ
Wissenstest des Tages
Von ZEIT ONLINE
01. Oktober 2023
SPIELEN

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

Gesellschaft Letzte Generation • Rechtsextremismus • Extremwetter

Australien

Behörden ordnen wegen Buschbränden Evakuierungen an



Optimize

Lazy Loading

Fassaden

Font Loading

Google Fonts




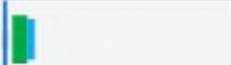







```
/* styles.css */  
  
@import url('https://fonts.googleapis.com/css2?family=Montserrat');  
  
h1 { font-family: 'Montserrat'; }
```

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	priva...	
 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	priva...	
 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	publi...	
 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

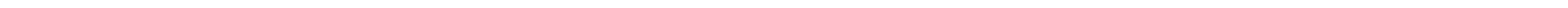
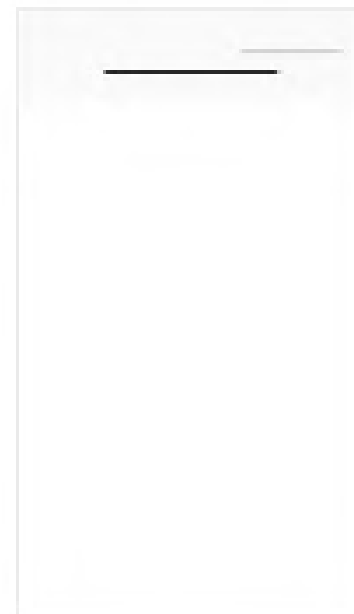
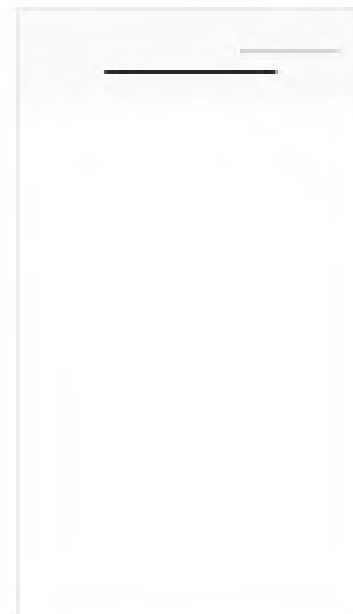
Lazy Loading

Fassaden

Font Loading

Font Display

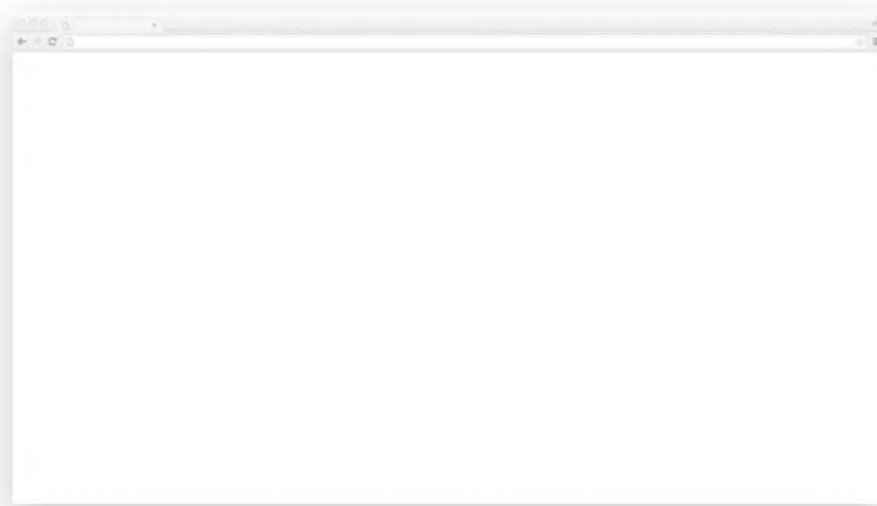
... und während dem Laden der Webfonts?



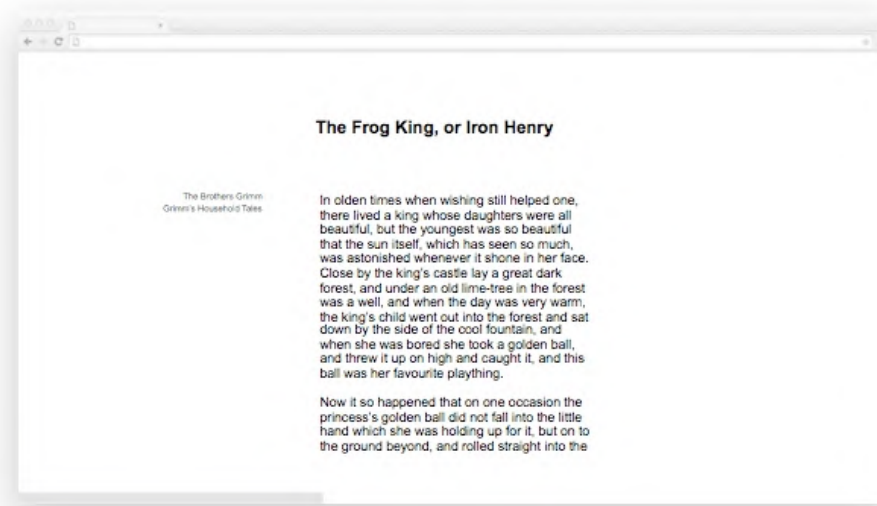
... und während dem Laden der Webfonts?



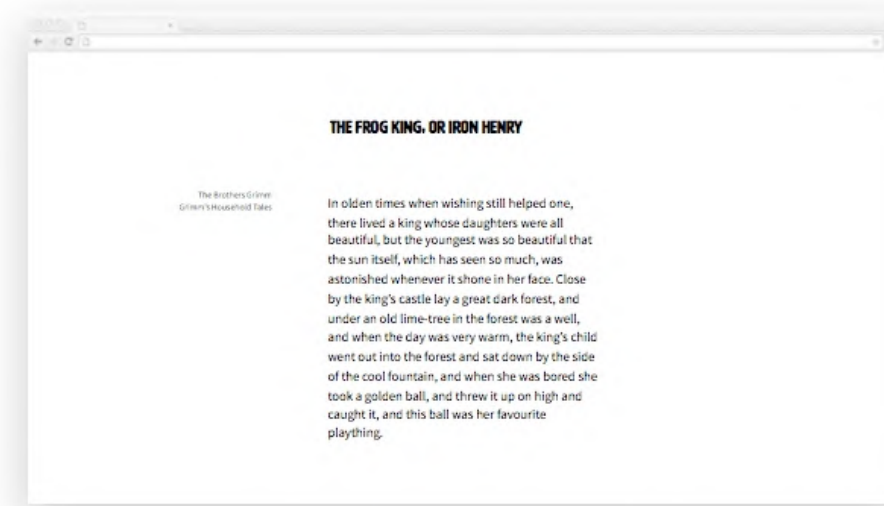
Flash Of Unstyled Text (FOUT)



request content

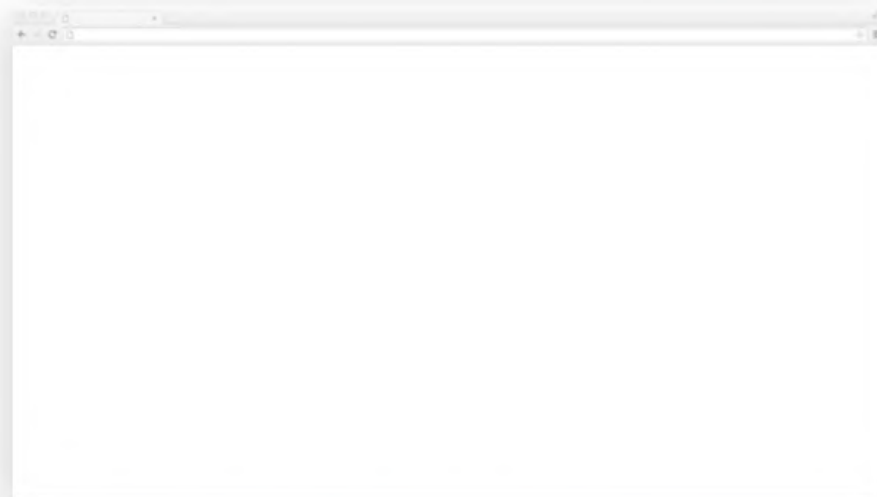


content loads

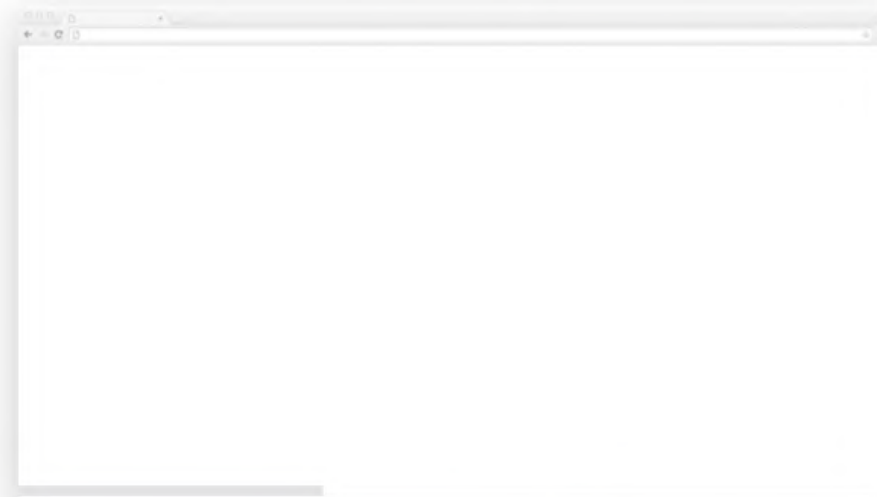


web fonts load

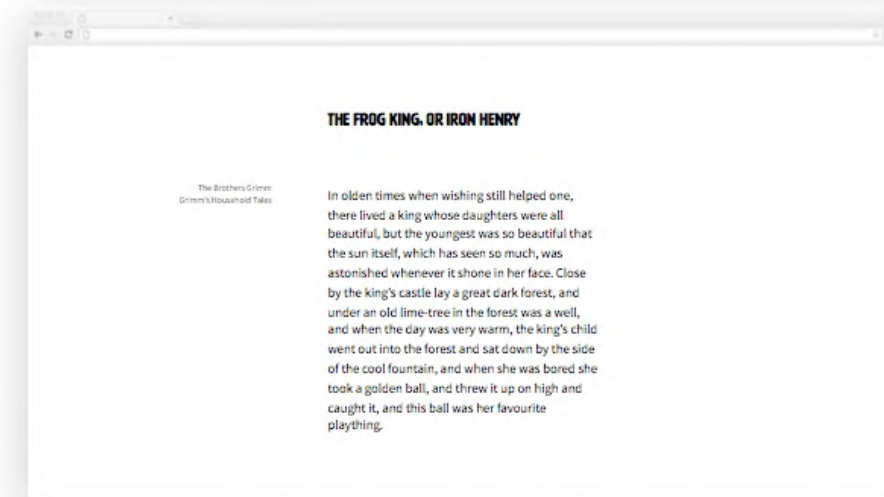
Flash Of Invisible Text (FOIT)



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.

CSS font-display - WD

@font-face descriptor font-display that allows control over how a downloadable font renders before it is fully loaded.

Current aligned Usage relative Date relative Filtered All

Chrome	Edge [*]	Safari	Firefox	Opera	IE
4-48			2-45	10-35	
49-59	12-18	3.1-11	46-57	36-46	
60-109	79-109	11.1-16.2	58-109	47-94	6-10
110	110	16.3	110	95	11
111-113		16.4-TP	111-112		

```
@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 langsamen 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	Type	Size	Time	Cache-...	Waterfall
index.html	200	docu...	10.3 ...	2.22 s		
normalize.css	200	style...	6.3 kB	2.76 s		
styles-large...	200	style...	225 kB	28.29 s		
event-wedd...	200	png	1.4 MB	1.4 min		
avatar1.png	200	png	389 kB	47.52 s		
event-limbo...	200	png	1.5 MB	1.5 min		
avatar2.png	200	png	313 kB	38.88 s		
event-yoga...	200	png	961 kB	1.2 min		
avatar4.png	200	png	478 kB	1.0 min		
event-fashi...	200	png	1.5 MB	1.6 min		
event-tour.p...	200	png	810 kB	1.3 min		
avatar6.png	200	png	451 kB	1.3 min		
event-karao...	200	png	941 kB	1.7 min		
event-office...	200	png	1.2 MB	1.9 min		
avatar8.png	200	png	1.5 MB	2.0 min		
event-funer...	200	png	1.1 MB	2.0 min		
avatar7.png	200	png	523 kB	1.8 min		
avatar5.png	200	png	602 kB	1.9 min		
avatar3.png	200	png	478 kB	2.0 min		
hero.png	200	png	724 kB	1.6 min		
favicon.ico	200	x-icon	15.3 ...	672 ms		

The screenshot shows the Network tab in Chrome DevTools. A context menu is open over the 'Initiator' column header, with 'Initiator' selected. The table below shows a list of requests with columns for Name and Status.

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

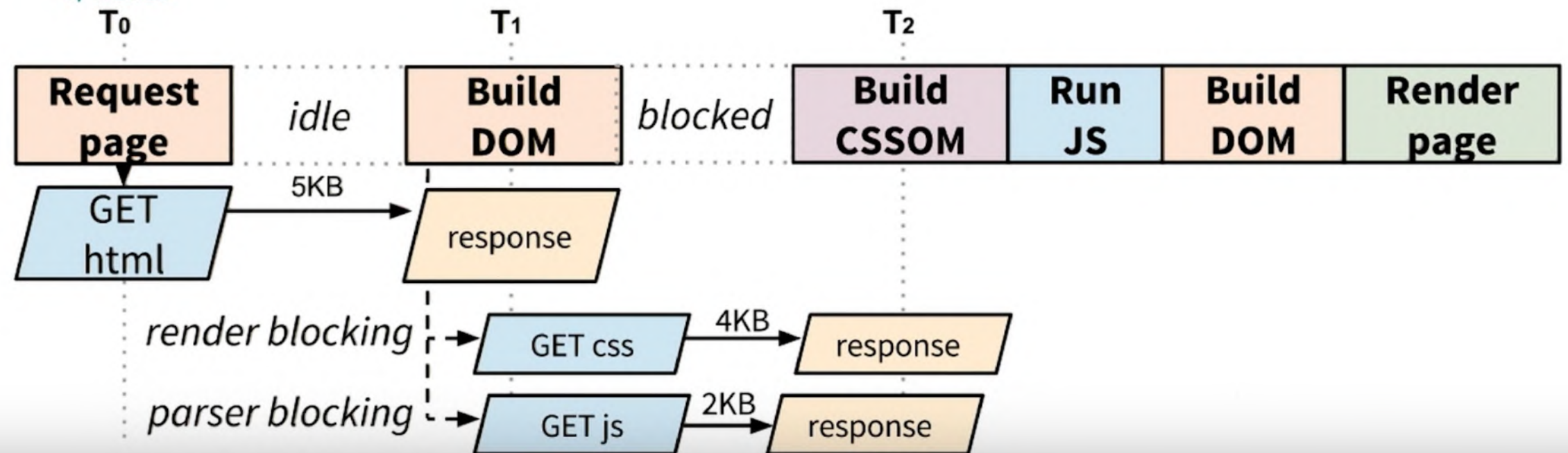
The screenshot shows the Network tab in Chrome DevTools with columns for Name, Status, Type, and Initiator. The 'hero.png' request is highlighted in blue.

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 in Browser

```
<html>
  <head>
    <meta name="viewport" content="width=device-width,initial-scale=1.0">
    <link href="style.css" rel="stylesheet">
  </head>
  <body>
    <p>Hello <span>web performance</span> students!</p>
    <div></div>
    <script src="app.js"></script>
  </body>
</html>
```



Preload

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

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



Willkommen beim professionellen Lamaverleih

Ob für Firmenevents, Hochzeiten, Geburtstagsfeiern oder Naturausflüge - unsere Lamas sind die perfekte Ergänzung und garantieren Ihnen und Ihren Gästen ein

Elements Console Sources Network Lighthouse

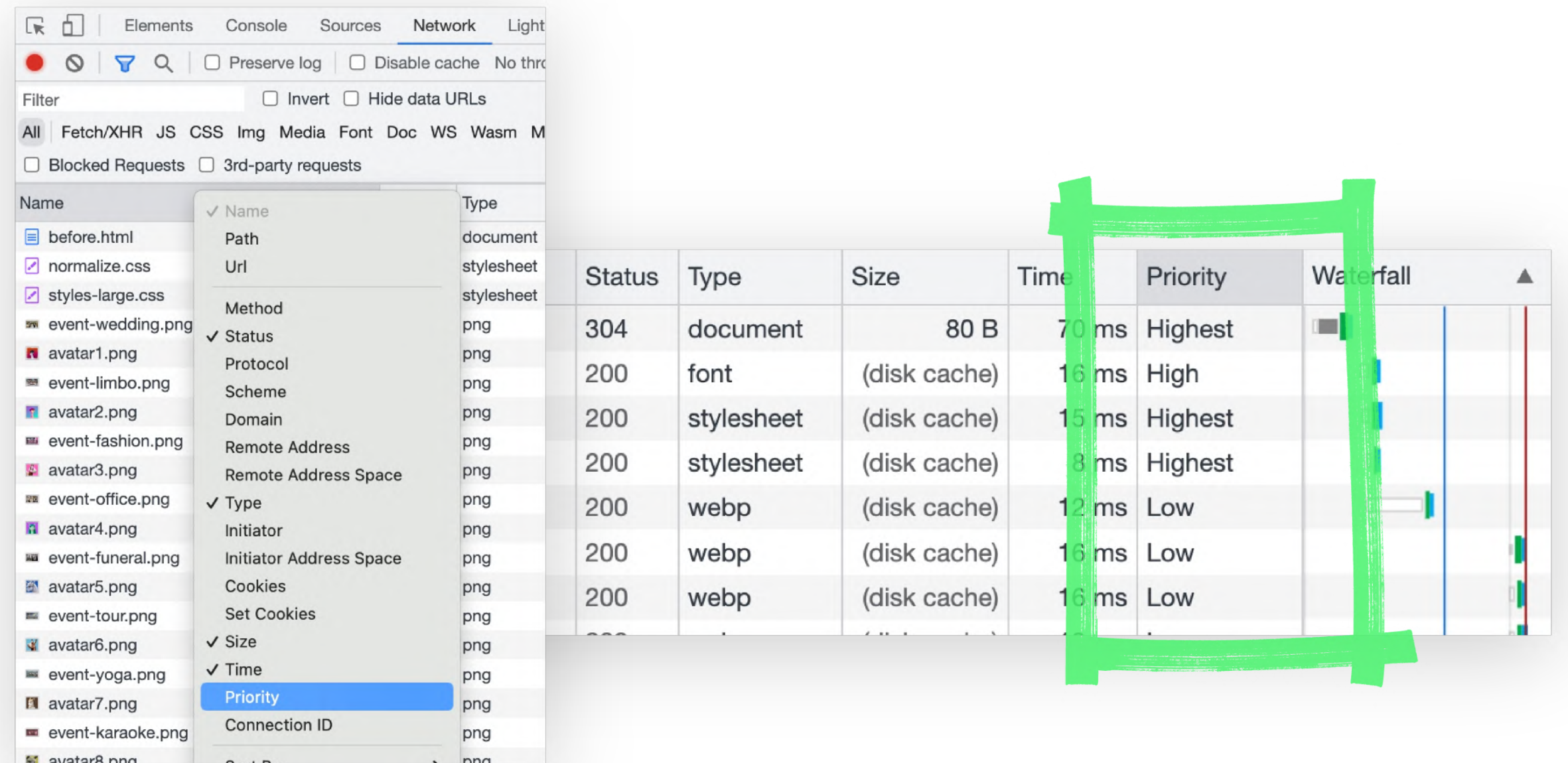
Filter Invert Hide data URLs

All Fetch/XHR JS CSS **Img** Media Font Doc WS Wasm Manifest Other

Has blocked cookies Blocked Requests 3rd-party requests

Name	S...	Type	Initiator	Size	Time	C...	Waterfall
hero.png	200	png	index.html	724 kB	24.2...		
normalize.css	200	style...	index.html	6.3 kB	804 ...		
styles-large.css	200	style...	index.html	225 kB	7.89 s		
event-wedding.png	200	png	index.html	1.4 ...	47.2...		
avatar1.png	200	png	index.html	389 kB	13.4...		
event-limbo.png	200	png	index.html	1.5 ...	51.2...		
avatar2.png	200	png	index.html	313 kB	18.8...		
event-fashion.png	200	png	index.html	1.5 ...	49.7...		
avatar3.png	200	png	index.html	478 kB	35.2...		
event-office.png	200	png	index.html	1.2 ...	51.9...		
avatar4.png	200	png	index.html	478 kB	51.4...		
event-funeral.png	200	png	index.html	1.1 ...	59.7...		
avatar5.png	200	png	index.html	602 kB	59.7...		
event-tour.png	200	png	index.html	810 kB	59.7...		
avatar6.png	200	png	index.html	451 kB	59.7...		
event-yoga.png	200	png	index.html	961 kB	59.7...		
avatar7.png	200	png	index.html	523 kB	59.7...		
event-karaoke.png	200	png	index.html	941 kB	55.4...		
avatar8.png	200	png	index.html	1.5 ...	59.7...		
favicon.ico	200	x-icon	Other	15.3...	672 ...		

Developer Tools: Resource Priority



The screenshot shows the Chrome Developer Tools Network tab. On the left, a list of resources is displayed, including 'before.html', 'normalize.css', 'styles-large.css', and several 'event-*.png' and 'avatar*.png' files. A context menu is open over the list, with 'Priority' selected. On the right, a table displays the details of the selected resource, including Status, Type, Size, Time, and Priority. A green box highlights the 'Priority' column and the 'Waterfall' column header.


Status	Type	Size	Time	Priority	Waterfall
304	document	80 B	70 ms	Highest	
200	font	(disk cache)	16 ms	High	
200	stylesheet	(disk cache)	15 ms	Highest	
200	stylesheet	(disk cache)	8 ms	Highest	
200	webp	(disk cache)	12 ms	Low	
200	webp	(disk cache)	16 ms	Low	
200	webp	(disk cache)	16 ms	Low	



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

Resource Hints: preload - CR

Using `<link rel="preload">`, browsers can be informed to prefetch resources without having to execute them, allowing fine-grained control over when and how resources are loaded.

Current aligned Usage relative Date relative Filtered All 

Chrome	Edge [*]	Safari	Firefox	Opera	IE
			2-55		
	12-16	3.1-10.1 ¹	56		
4-49	⁴ 17-18	² 11 	³ 57-84 	10-36	
50-110	79-110	11.1-16.2	85-110	37-94	6-10
111	111	16.3	111	95	11
112-114		16.4-TP	112-113		

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.

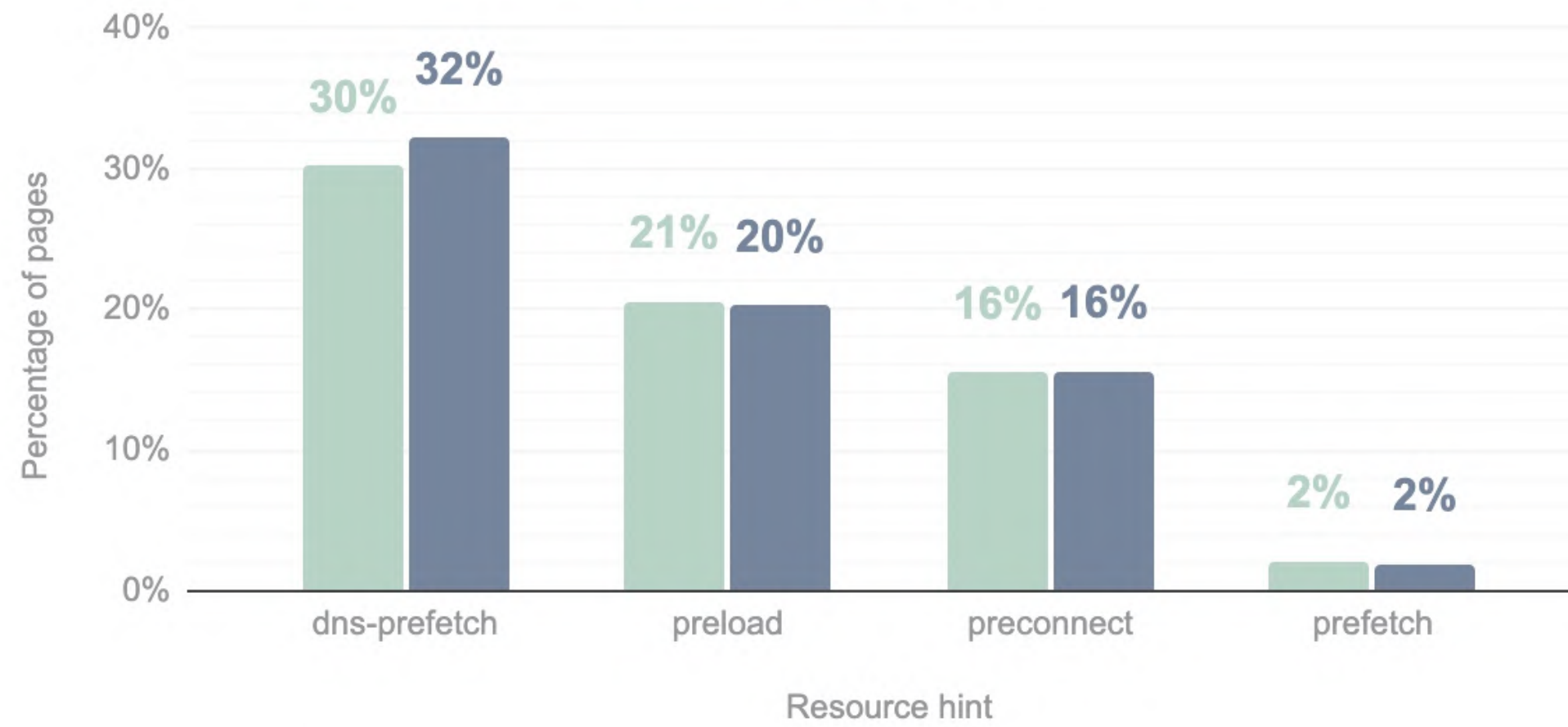
Es verbraucht Traffic, sollte also bewusst und gezielt eingesetzt werden. User können es in den Browser-Settings unterbinden.

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

Fonts resource hints usage

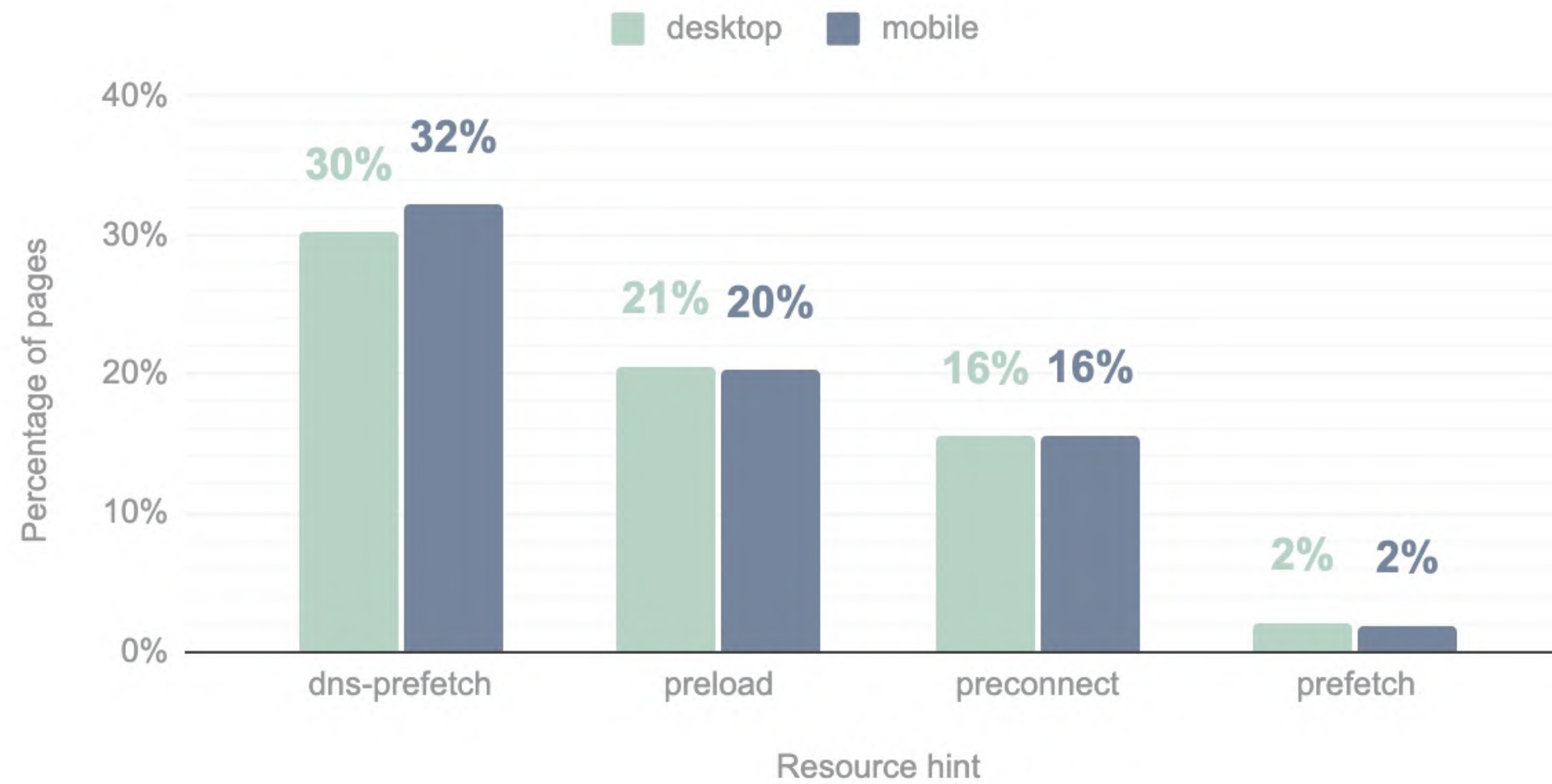
Web Almanac 2022: Fonts

desktop mobile



Fonts resource hints usage

Web Almanac 2022: Fonts



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

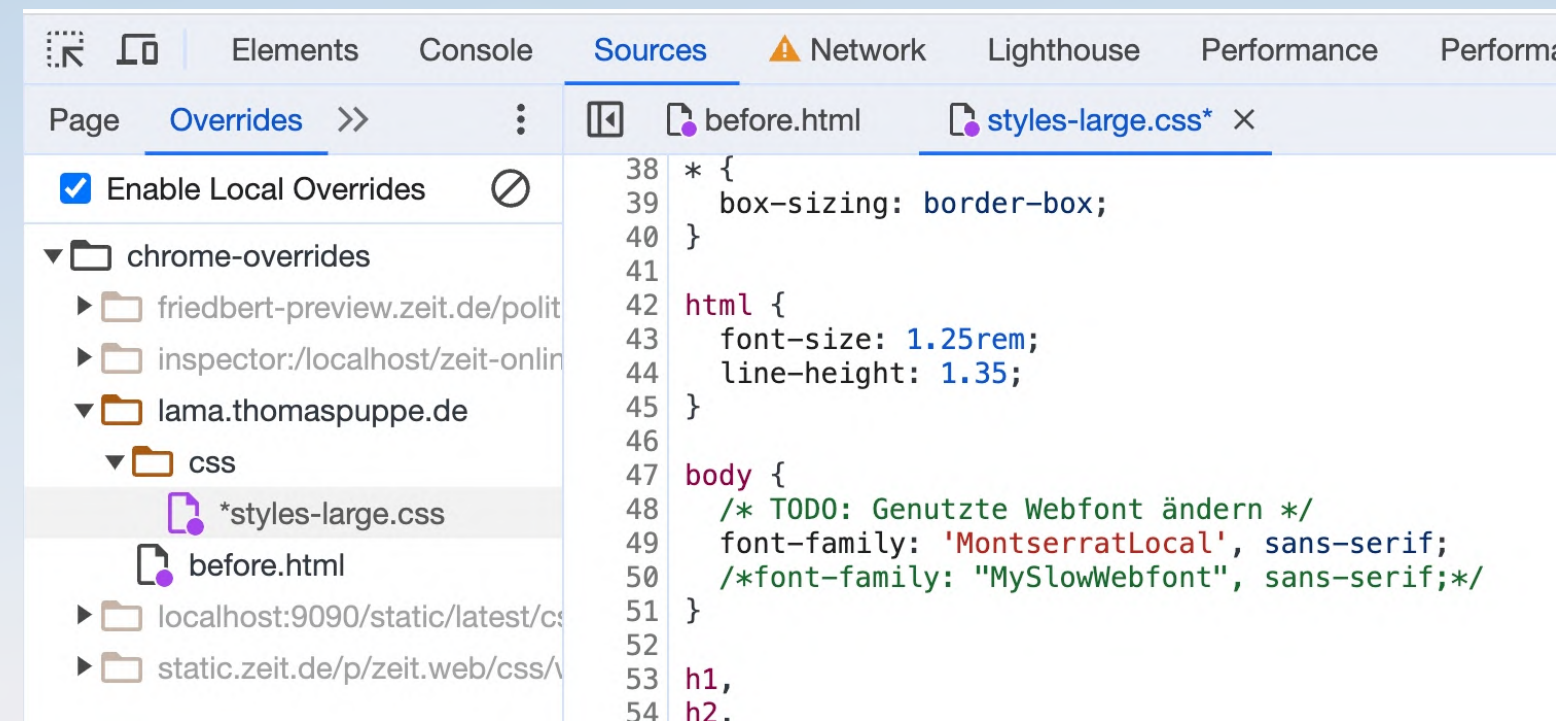
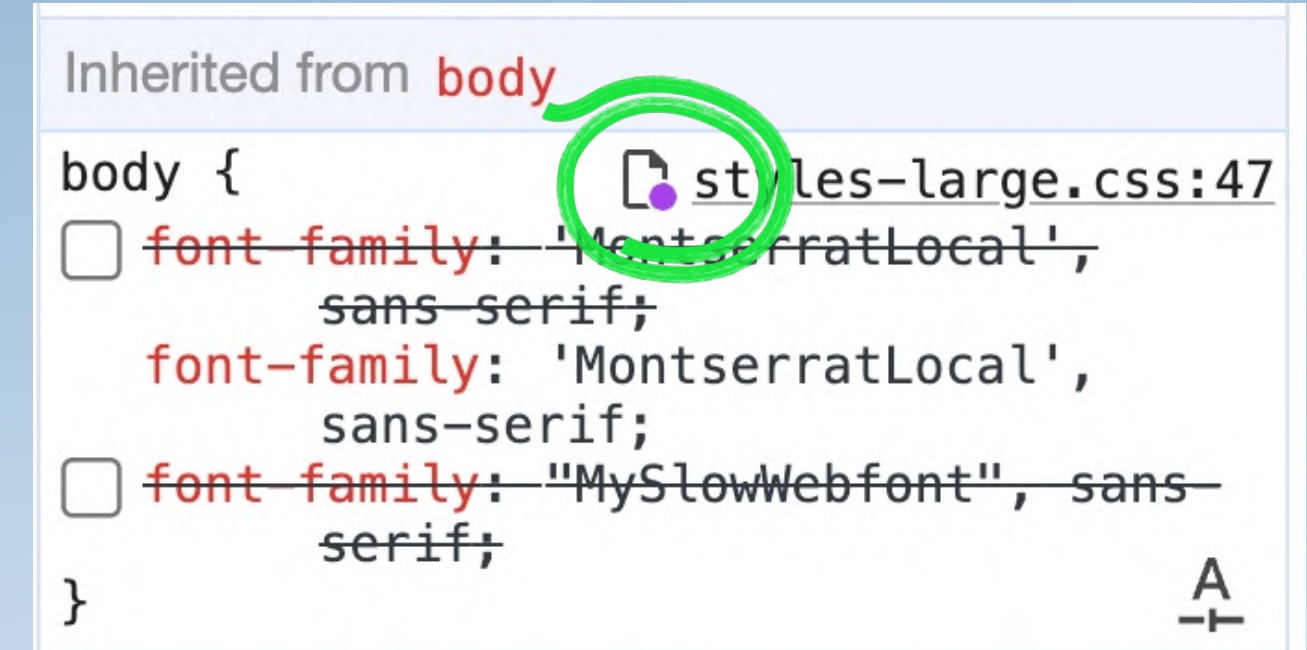
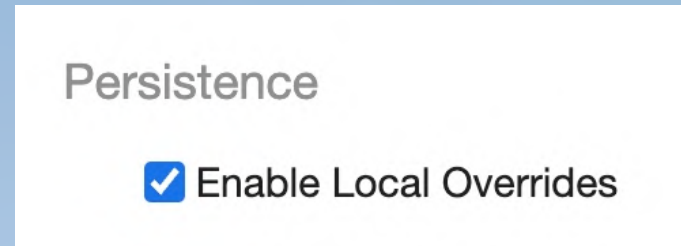


Credit: Pitch Sticker "Cyberpunk"

Exkurs

Local Overrides in den Chrome DevTools

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



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

Rent a llama

Even a static website can be slow.



Willkommen beim professionellen Lamaverleih

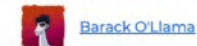
Ob für Firmenevents, Hochzeiten, Geburtstagsfeiern oder Naturlausflüge - unsere Lamas sind die perfekte Ergänzung und garantieren Ihnen und Ihren Gästen ein besonderes Erlebnis. Unsere Lamas sind gut ausgebildet und bestens gepflegt. Wir stellen sicher, dass unsere Lamas den höchsten Standard an Sicherheit, Gesundheit und Tierwohl erfüllen, so dass Sie sich voll und ganz auf Ihr Event konzentrieren können.

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.



Limbo mit Lamas

Machen Sie sich bereit, sich mit unserem Lama-Limbo-Wettbewerb zu biegen und zu grooven! 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 pelzigen Begleiter mit, um das Fest zu genießen und Erinnerungen zu schaffen, die ein Leben lang halten werden.



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

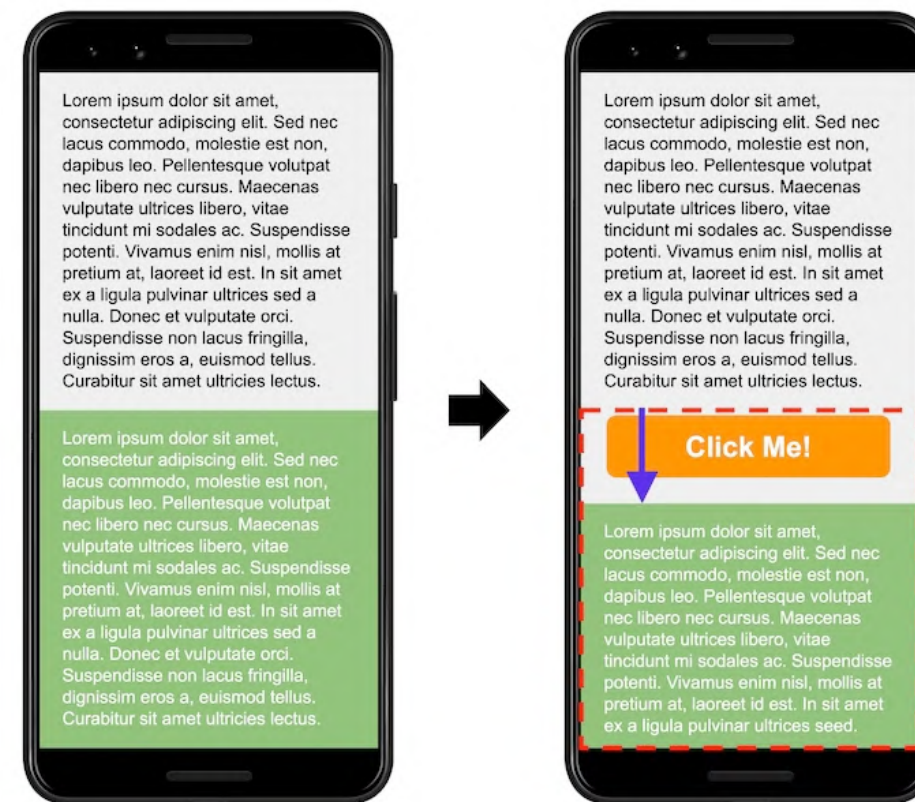


Firmen-Events

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 T

#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/>
- `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.

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

M

MEASURE

Tooling und
Monitoring

A

ATTITUDE

Performance
Culture

Pause



Credit: Pitch Sticker "Cyberpunk"

Measure



Measure

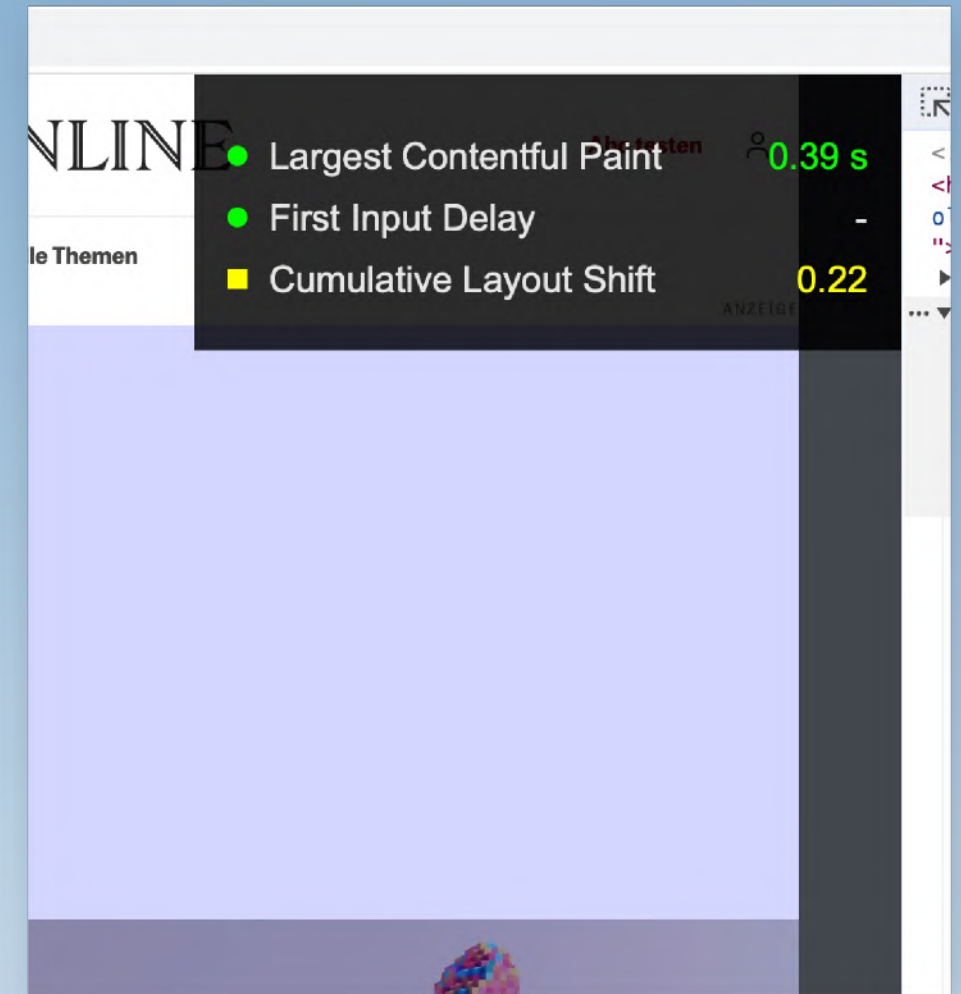
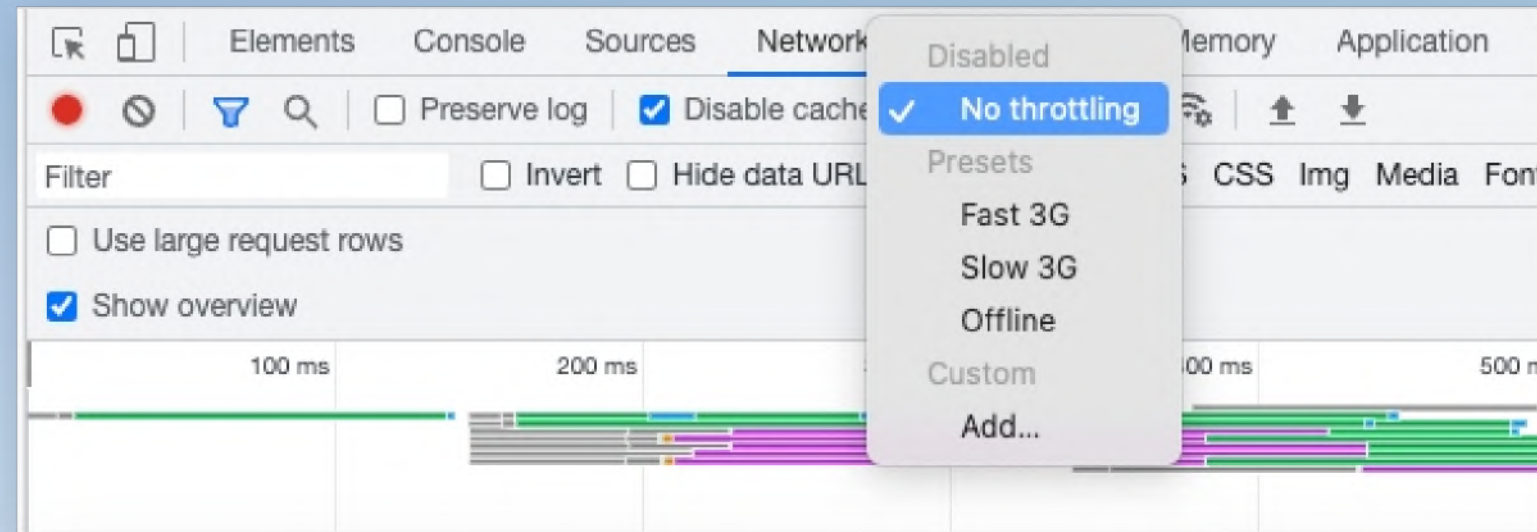
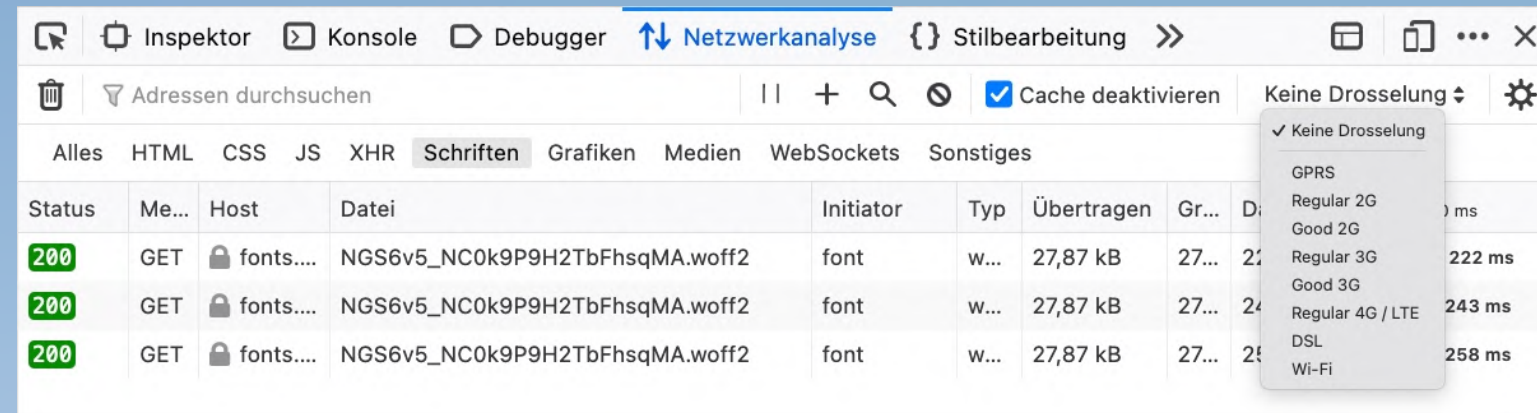
DevTools

Measure

DevTools

- Throttling
- Local Source Overrides
- Web Vitals Score
- Layout Shift
- Unused CSS/JS

- **JavaScript:** Memory, Frame Rate, CPU Flame Graphs



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	

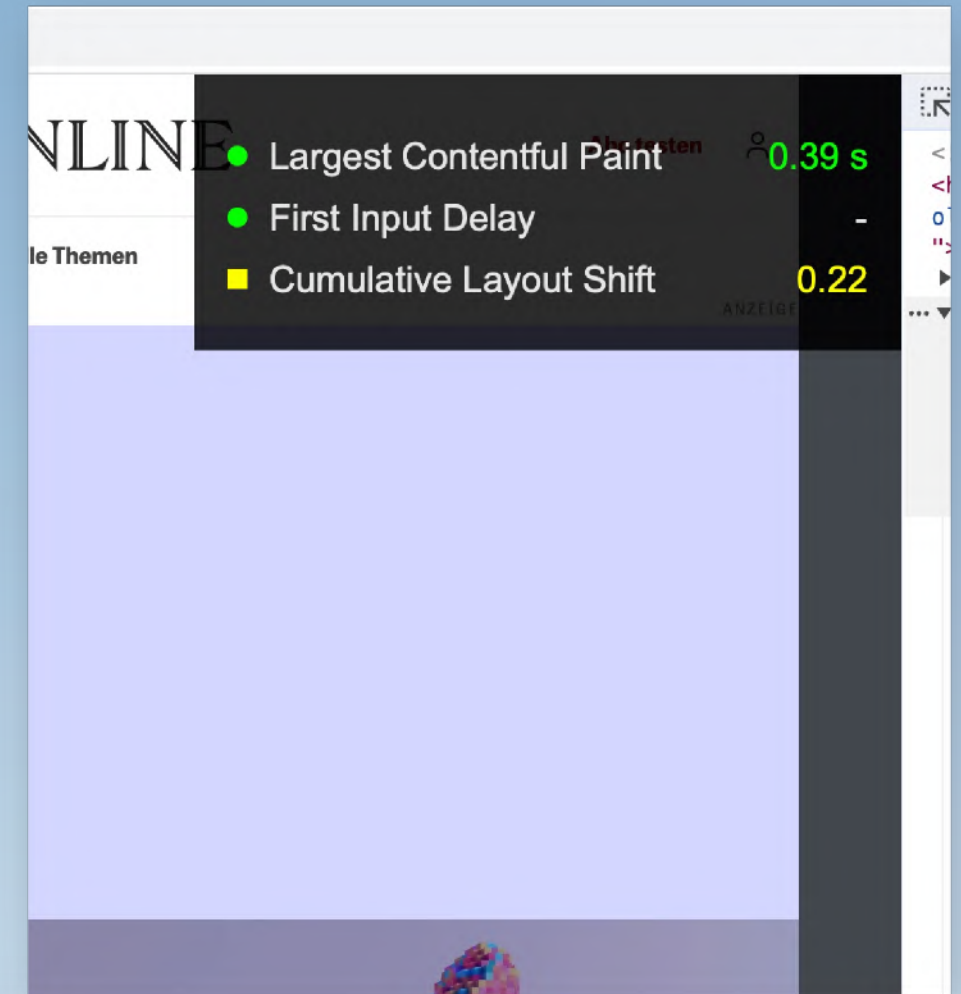
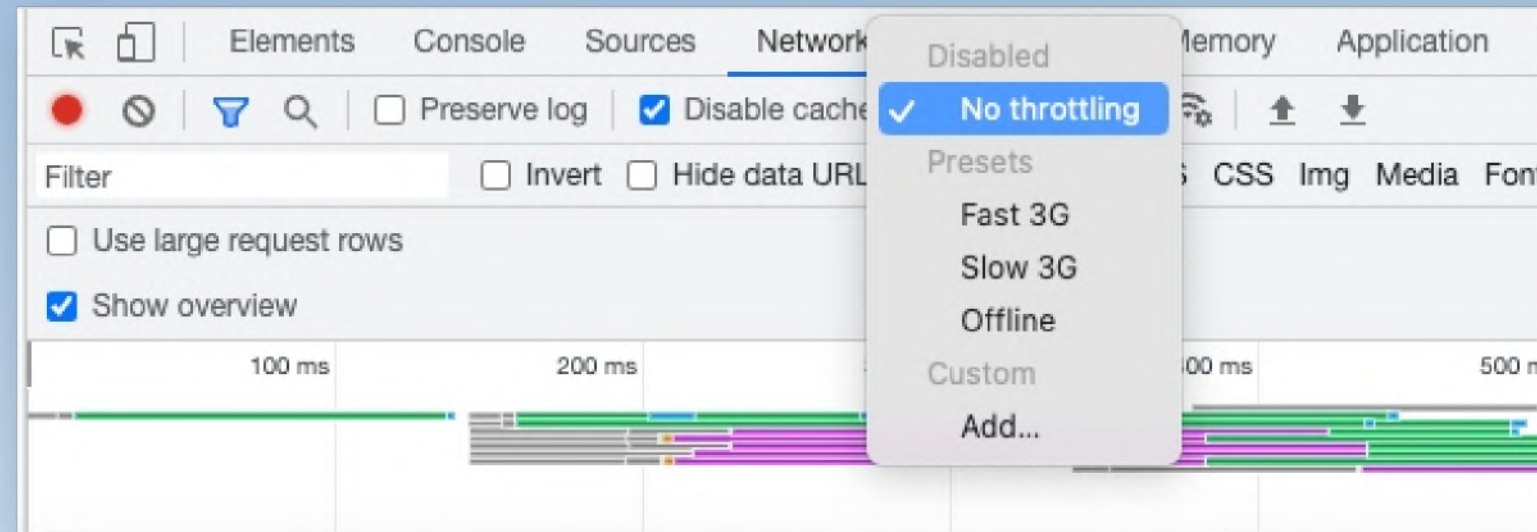
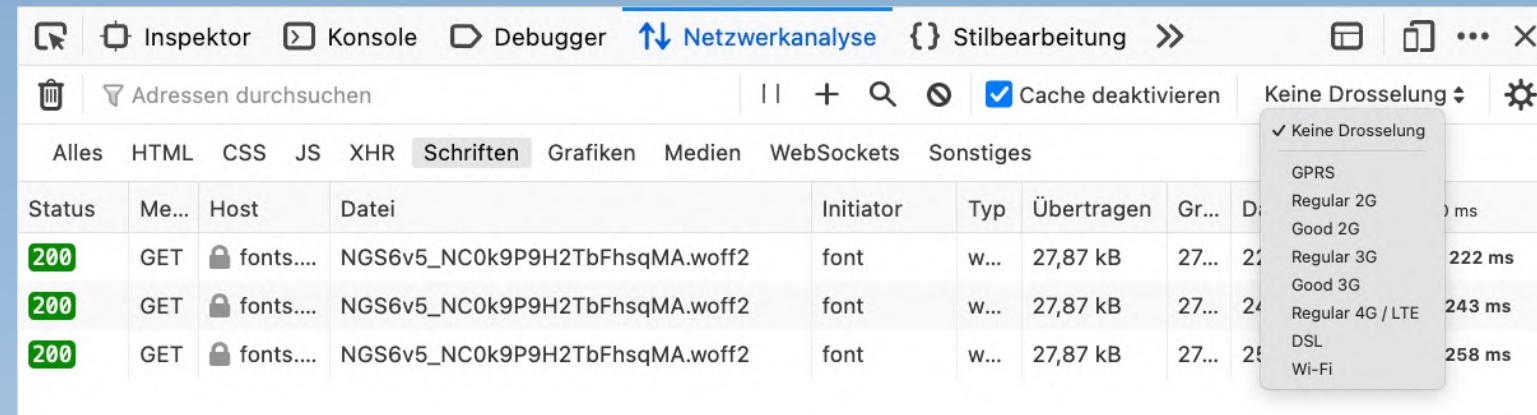
URL	Type	Total Bytes	Unused Bytes	Usage Visualization
https://consent-cdn.zeit.de/wrapperMessagingWithoutDetection.js	JS (per function)	204 217	95 490 46.8%	
https://interactive.zeit.de/wiegehtesi.../app.c0381a78a97b00cf65db.cached.js	JS (per function)	156 095	75 866 48.6%	
https://interactive.zeit.de/g/2022/energiekostenmonitor/.../index.75ca3a4e.css	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.4ac770b16c740c03c50e84fbd93f1dd9.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



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hero.webp	200	webp	(disk cache)	12 ms	Low	

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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.4ac770b16c740c03c50e84fbd93f1dd9.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

Lighthouse

Measure

Lighthouse

- DevTools

- CLI

``npm install -g lighthouse``

- `npx lighthouse`

The screenshot displays a Lighthouse performance report for the website 'BLOG VON THOMAS PUPPE, WEB DEVELOPER.'. At the top, a large green circle contains the score '100'. Below this, the word 'Performance' is centered, followed by a note: 'Values are estimated and may vary. The performance score is calculated directly from these metrics. See calculator.' A legend indicates that scores of 90-100 are represented by a green dot. The 'METRICS' section lists several key performance indicators, all of which are in the green (passing) range: First Contentful Paint (0.3 s), Largest Contentful Paint (0.4 s), Total Blocking Time (0 ms), Cumulative Layout Shift (0), and Speed Index (0.3 s). Below the metrics, there are buttons for 'View Treemap' and 'View Original Trace'. A grid of thumbnail images shows various content elements from the website, including quotes from conferences like SmashingConf 2022 and Fronteers 2019. At the bottom of the metrics section, there are filters for 'Show audits relevant to:' with options for 'All', 'FCP', 'LCP', 'TBT', and 'CLS'. The 'DIAGNOSTICS' section lists several issues, most of which are currently disabled (indicated by a grey circle): 'Ensure text remains visible during webfont load', 'Page prevented back/forward cache restoration' (with 4 failure reasons), 'Serve static assets with an efficient cache policy' (with 3 resources found), 'Avoid chaining critical requests' (with 1 chain found), 'Keep request counts low and transfer sizes small' (with 5 requests and 44 KiB), and 'Largest Contentful Paint element' (with 1 element found). At the very bottom, it states 'PASSED AUDITS (34)' and provides a 'Show' link.

Measure

DevTools

Lighthouse

Page Speed Insights

Measure

Pagespeed Insights

pagespeed.web.dev

PageSpeed Insights [Link kopieren](#) [Dokumentation](#)

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

Rent a Llama
Even a static website can be slow.
Willkommen beim professionellen Lamaverleih

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](#)

Empfehlung

- ▲ 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

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)

Metric	Experiment	Control	Impact
Start Render	0.2s	2s	FASTER
First Contentful Paint	0.15s	1.93s	FASTER
Speed Index	0.48s	14.33s	SLOWER
Total Blocking Time	0.16s	0.88s	FASTER
Page Weight	69 KB	8794 KB	HEAVIER

Measure

Webpagetest

webpagetest.org

und

perfproxy.com

zum Erzeugen von mehr Experimenten

The screenshot shows the Catchpoint WebPageTest Pro interface. At the top, it displays the URL `https://javascript-days.de/berlin/` and the date `15.10.2023, 21:18:58`. The main heading is "WebPageTest Pro Experiment". Below this, there are settings for "Experiment", "SETTINGS: DESKTOP", "v118", "Cable", and "Frankfurt, Germany". A "View" dropdown is set to "Experiment Results & Filmstrip" and a "Tools" dropdown is set to "Export".

The "Experiment Results" section shows "EXPERIMENTS APPLIED:" with "Defer Render-Blocking Scripts", "Async Render-Blocking Scripts", and "Inline More". "LINKS:" includes "Experiment Results", "Experiment", "Control", and "Original".

The "Experiment Impact" section shows performance metrics:

Metric	Value	Impact	Experiment	Control
Start Render	0.2s	FASTER	1.8s	2s
First Contentful Paint	0.15s	FASTER	1.78s	1.93s
Speed Index	0.48s	SLOWER	14.8s	14.33s

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:

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)

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

Injections (each on a new line)

Top of `<html>`

Top of `<head>`

WebPageTest Script

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

Measure

DevTools

Lighthouse

Page Speed Insights

Webpagetest

Speedcurve

Measure

Speedcurve

speedcurve.com

VITALS

Your site's current performance in key areas of user experience.

Loading (LCP)	Interactivity (FID)	Visual Stability (CLS)
1.35s	32ms	0

[Explore your Web Vitals](#)

USER HAPPINESS

How real users experience the way your site loads.

Happy	Okay	Unhappy
24%	62%	14%

[Learn about your visitors](#)

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` CLS	100%
Does not use passive listeners to improve scrolling performance	100%
Some third-party resources can be lazy loaded with a facade TBT	100%
Reduce the impact of third-party code TBT	100%
Ensure text remains visible during webfont load LCP	100%
Avoid an excessive DOM size TBT	100%

FILMSTRIP

What a user actually sees as the page loads on different sites.

Image Video

HP Rebrush Benchmark

11.5

ZEIT Online

11.5

FAZ Benchmark

11.5

Spiegel Benchmark

11.5

SZ Benchmark

11.5

Welt Benchmark

11.5

ZEIT Online HP PUR

8.4

Measure

DevTools

Lighthouse

Page Speed Insights

Webpagetest

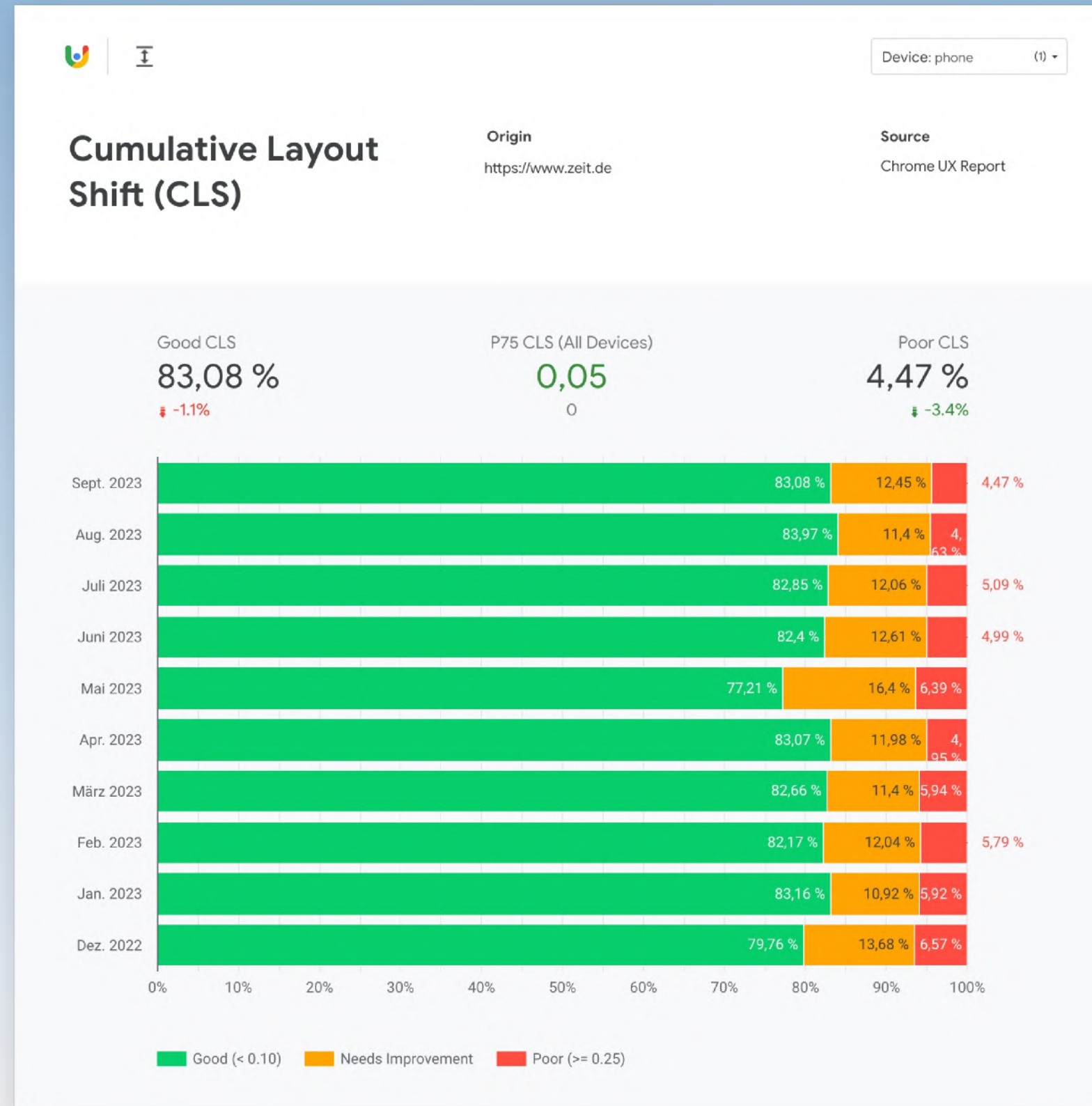
Speedcurve

CrUX

Measure

CrUX

developer.chrome.com/docs/crux/dashboard/



Fünf Säulen von Website Performance

A

AVOID

Benutzen wir alles?
Brauchen wir alles?

R

REDUCE

Cachen,
Komprimieren,
Minimieren.

O

OPTIMIZE

Ladeverhalten und
Priorisierung

M

MEASURE

Tooling und
Monitoring

A

ATTITUDE

Performance
Culture



WORK HARDER

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/davidsonfelli/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>