

**Making websites run  
faster &  
environmentally  
friendly**

# ABOUT TONIGHT

## **The aim of tonight ...**

To help you come away with an understanding of the impact web performance can have on your business, and ways you can start to test & fix performance issues.

## **So, please**

- Don't be afraid to ask questions.
- Feel free to test your own sites as we go.

# AGENDA

1. Introductions
2. Why should I care about making my site fast?
3. What is Web Performance?
4. How can I test my site's performance?
5. What makes a site environmentally friendly?
6. Learning: Live Audits

**Part 1**

# **Introductions**

# ABOUT ME

🐦 🐱 @fershad

## Fershad Irani

[www.fershad.com](http://www.fershad.com)

- Web performance & sustainability consultant
- 🇺🇸 Aussie living in Taipei, Taiwan 🇹🇼
- Watches Rugby. Plays Touch footy.



# And you ...?

- What do you do?
- Why are you here?

**Part 2**

**Why?**

FROM A BUSINESS  
PERSPECTIVE

# A 0.1s faster mobile experience

Milliseconds Makes Millions

- Deloitte Ireland

## Retail

Conversions increased by **8.4%** and average order value increased by **9.2%**.

## Travel

Conversions increased by **10.1%** and average order value increased by **1.9%**.

## Luxury Goods

Page views per session increased by **8.6%**.

## Lead Generation

Bounce rate reduced by **8.3%**.

Walmart found every 100ms improvement also resulted in up to a 1% increase in revenue.

WPO Stats

# WPO Stats

<https://wpostats.com>

**It's so much  
more**

**Cost Savings**

**Expands Reach**

**SEO**

**Efficiency**

# Find the right balance

- What are your business goals?
- What role does your website play in that?

## Part 3

# What is web performance

# Not just fast

- Yes, time to load is one thing.
- Smooth user experience.
- Responsive user experience.

# Core Web Vitals

## **Largest Contentful Paint (LCP)**

How fast does content appear?

## **Cumulative Layout Shift (CLS)**

How stable is layout of the page?

## **First Input Delay (FID)**

How responsive is the page to user interaction?

📷 FROM GOOGLE

# Core Web Vitals

*(Loading)*

# LCP

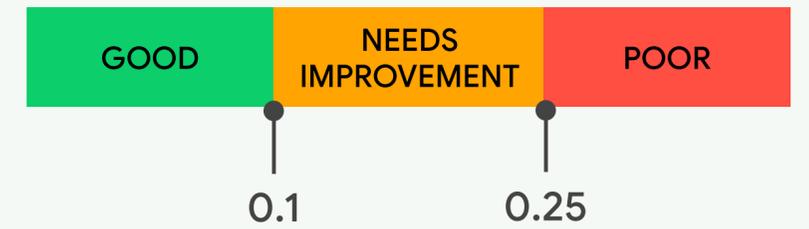
Largest Contentful Paint



*(Visual Stability)*

# CLS

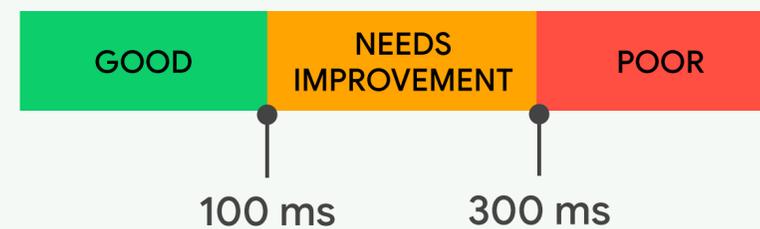
Cumulative Layout Shift



*(Interactivity)*

# FID

First Input Delay



## Part 4

# Testing site performance

# TWO TYPES OF DATA

## **Real user monitoring (RUM - aka Field data)**

- Measures how real world users are experiencing your website.
- Where available we should try to use field data for analysis.

## **Synthetic test results (aka Lab data)**

- Results from tests run in controlled environments.
- Can be run on simulated devices, with connection/hardware simulations.

**Part 4.1**

**RUM**

# CRUX

## **Chrome User Experience Report**

- Captured from sessions of Chrome users who have opted-in.
- Excludes those using Chrome on iOS.
- Data is anonymised
- Results won't be shown if not enough meaningful data is available.
- The CrUX dataset is updated monthly.

# Search Console

[https://search.google.com/  
search-console/](https://search.google.com/search-console/)

# Treo

<https://treo.sh/sitespeed>

# ON-PAGE MONITORING

## **Paid services**

- Speedcurve
- Pingdom
- Sentry
- Datadog

## **Roll your own**

- Performance API
- Perfume.js
- Web Vitals

**Part 4.2**

**Lab**

# KEEP IN MIND

## **Lab results are not perfect**

- Devices may be simulated
- Network conditions may be simulated
- Hardware limitations may be simulated
- Hundreds of other real world conditions are not accounted for

# PSI

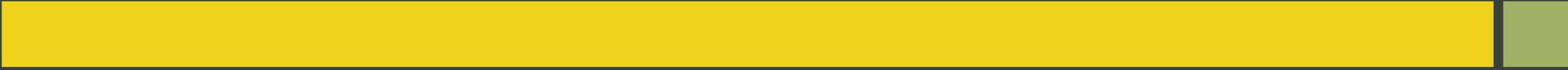
<https://pagespeed.web.dev/>

# WebPageTest

<http://webpagetest.org/>

## Part 5

# Web performance and the planet



**4%**

**Global CO2 emissions  
attributed to ICT**

Source

# What contributes to the web's carbon footprint?

## Data centers

The energy required to power the servers and facilities that host sites, APIs, and databases.

## Networks

The power required to push data around the planet.

15%

14%

52%

19%

## Consumer devices

The energy required to power consumer devices (including Wi-Fi modems).

## Production

The embodied emissions from the manufacturing of the hardware involved in the three areas above.

# Measure your site's carbon impact

[WEBSITECARBON.COM](https://www.websitecarbon.com)

**Website Carbon  
Calculator**

[DIGITALBEACON.CO](https://www.digitalbeacon.co)

**Beacon**

[ECOPING.EARTH](https://www.ecoping.com)

**EcoPing**

[SITESPEED.IO](https://www.sitespeed.io)

**SiteSpeed.io**

LESS DATA TRANSFERRED 👍

# What can be done?

## Optimise

- Images
- Fonts
- Video
- JavaScript
- CSS

## Cache & CDNs

- Browser cache
- Service workers
- Use a CDN

## Reduce 3rd Parties

- Self-host
- Look for green options
  - Are my third parties green?

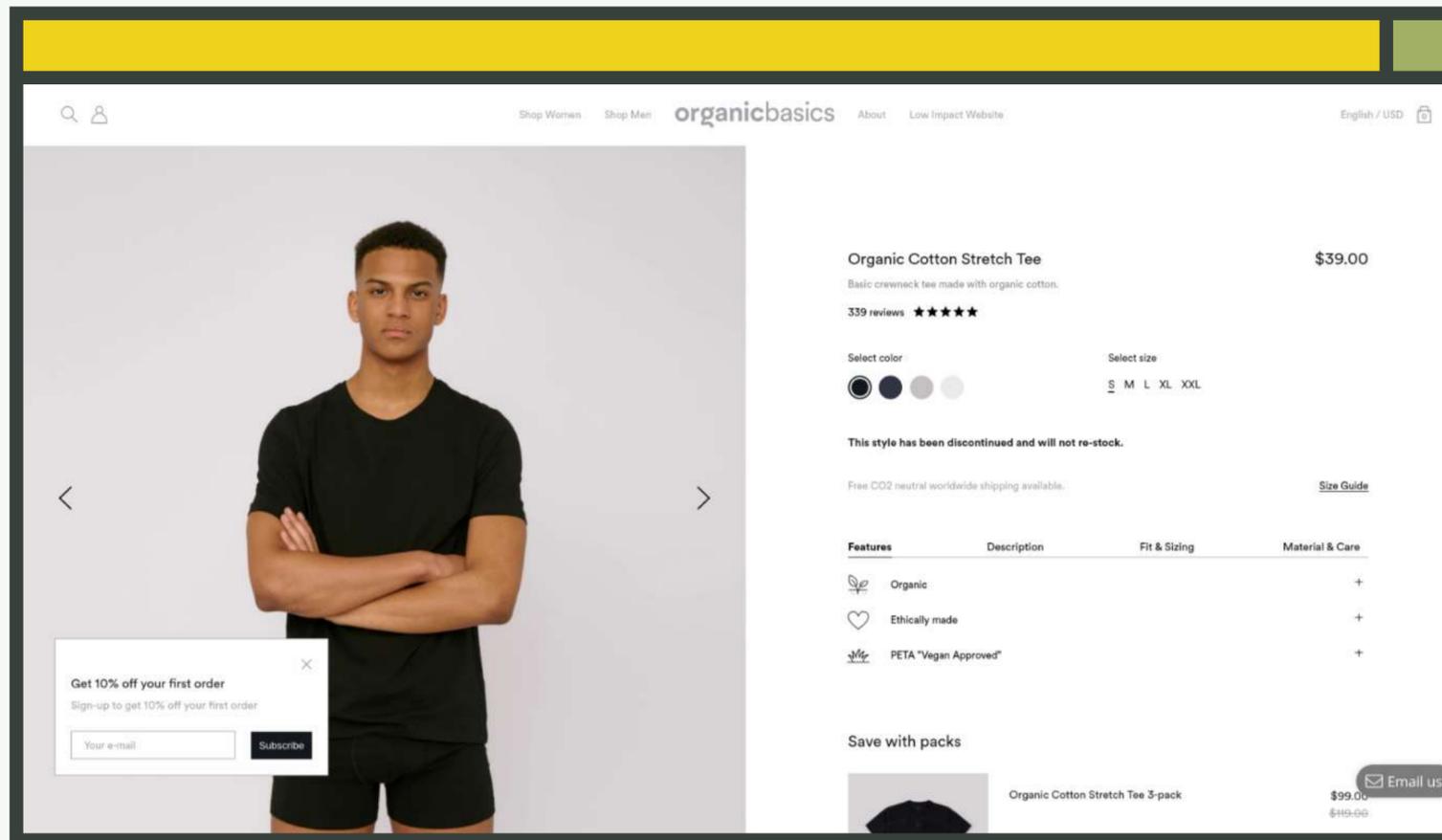
## Green web hosts

- Move to a green host
  - Green Web Foundation

# EXAMPLE: ORGANICBASICS

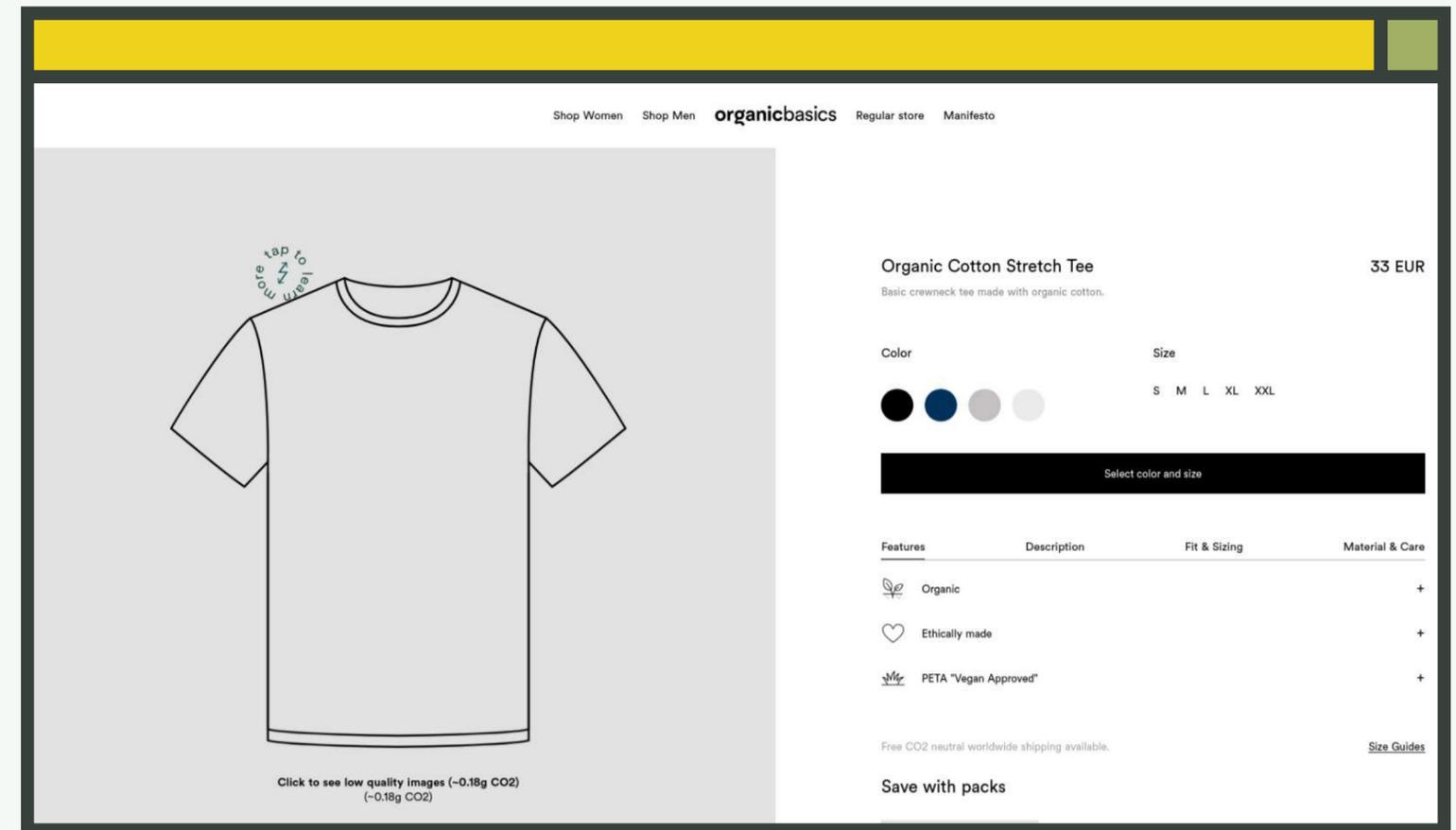
## Regular site

ORGANICBASICS.COM



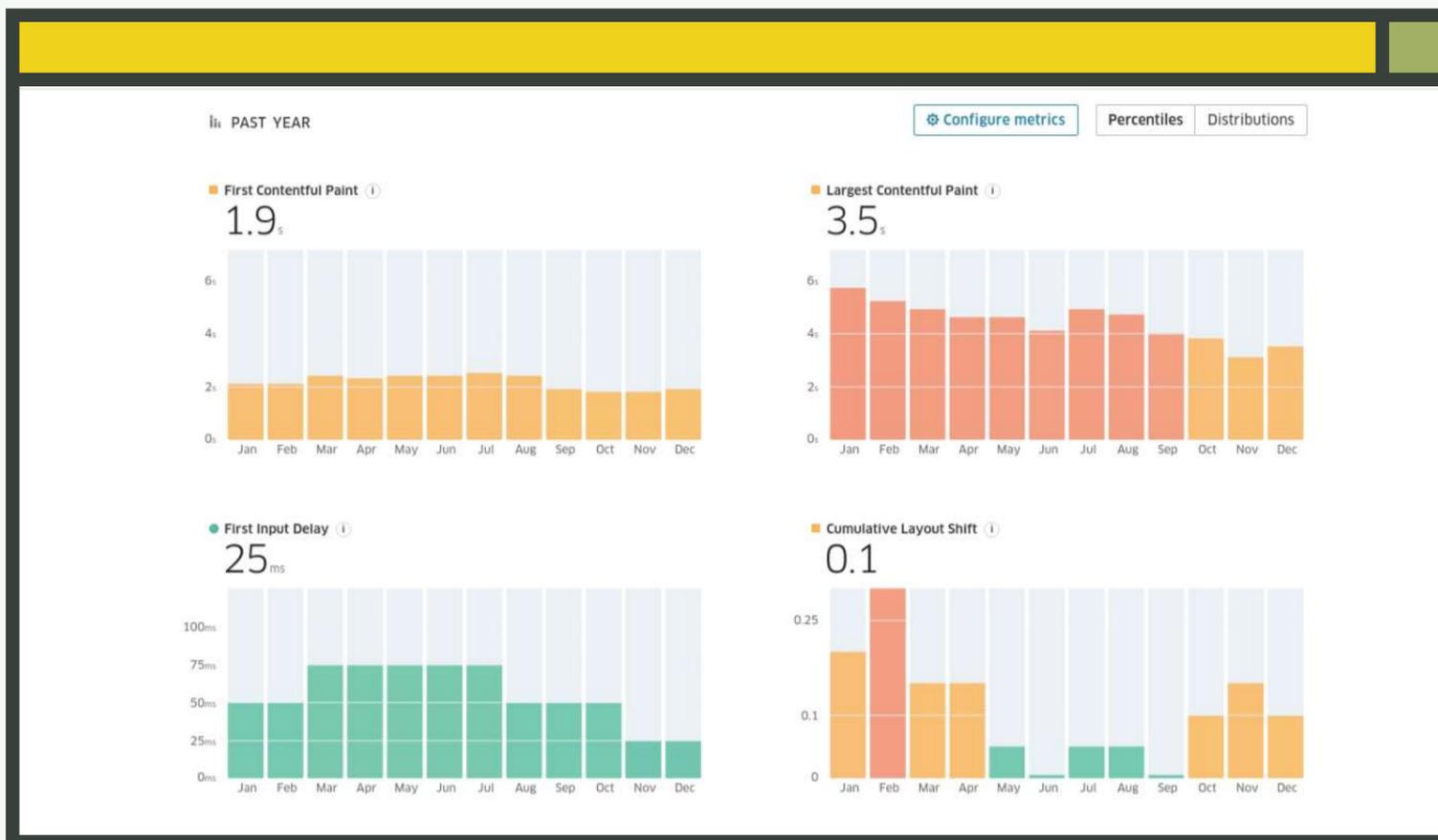
## Low impact site

LOWIMPACT.ORGANICBASICS.COM

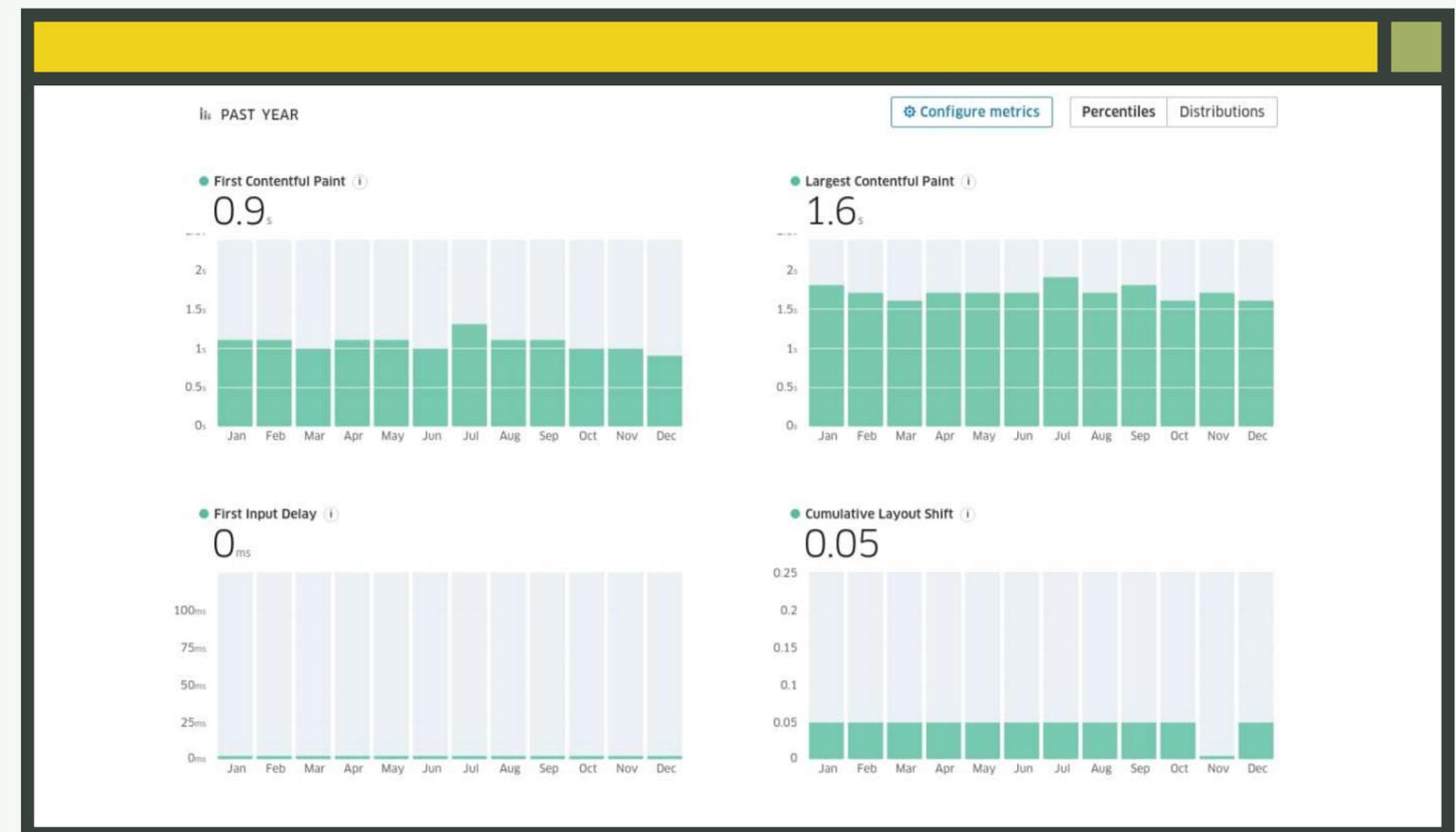


# EXAMPLE: ORGANICBASICS

## Regular site TREO



## Low impact site TREO



## Part 6

# Learning: Live Audits

**Every site is different**

# Thank you.

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[www.fershad.com/talks](http://www.fershad.com/talks)

## Appendix

# Fixing common performance issues

# Slow LCP

- Optimise images
- Optimise the “critical path”

# OPTIMISE IMAGES

## Reduce file size

- [Compressor.io](#)
- [ImageOptim](#)
- [Optimizilla](#)
- [Imgbot.ai](#)

## Use modern formats

Newer formats such as WebP and AVIF are much smaller.

- [Squoosh](#)

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

# OPTIMISE IMAGES

## Defer loading (lazy load)

Defer loading off-screen images until just before they enter the viewport.

- Available in all modern browsers.

```

```

```

```

## Use an Image CDN

They do all the hard work for you!

- Clouinary
- Imgix
- Fastly
- ImageEngine

# OPTIMISE THE “CRITICAL PATH”

## Defer JavaScript execution

Defer whatever JavaScript isn't required for the initial page load.

Load other JavaScript asynchronously if you can.

```
<script src="/not-critical.js" defer ></script>  
<script src="/important.js" async ></script>
```

## Reduce your CSS bundle

The browser will stop rendering the page when it encounters CSS.

- Keep CSS files small.
- Avoid using @import inside CSS files.
- Inline critical CSS and load the rest later.

# High CLS

- Improve font loading
- Save space for images

# IMPROVE FONT LOADING

- Consider system fonts
- Use WOFF or WOFF2 formats
  - Font Squirrel
  - Transfonter
  - Fontie
- Remove unused characters (subsetting)
- Self-host fonts

Preloading can help start downloading earlier.

⚠ Use it sparingly.

```
<link rel="preload"
      href="webfont.woff2"
      as="font"
      type="font/woff2"
      crossorigin />
```

# SAVE SPACE FOR IMAGES

Give the browser a hint as to how much space it should leave for images when they load.

- Add height & width attributes to images in the HTML.
- Set either height or width to 100% in CSS.
  - Set the other property to auto.

```

```

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

# High FID

- Reduce how much JavaScript is used
- Load JavaScript on interaction

# REDUCE JAVASCRIPT

- Check your third-party code
- Code-splitting
- Tree-shaking
- Defer third-party code

**More tips at web.dev**

<https://web.dev/fast/#optimize-your-javascript>

# LOAD JAVASCRIPT ON INTERACTION

## Import on interaction pattern

<https://www.patterns.dev/posts/import-on-interaction/>

- Present a facade in place of an interactive element
- If the users interacts with the facade, then request the JavaScript
- Once downloaded, parsed and executed the JS will take over the experience.