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Performant Angular Applications

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Hi 👋 I am

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What is Web Performance?

- How fast is a website
  - Consider desktop, tablet, mobile
- Multiple factors
  - Page speed - driven by the application’s architecture and code
  - Network connection
  - Infrastructure
- User retention, engagement and (increased) sales

Embrace changes

Between **2010 and 2011 the total kilobytes of all resources requested by a page averaged to be ~657 KB on desktop** (and ~293 KB on mobile).

There were **68 average requests** for resources **on desktop** and 37 on mobile.

Embrace changes

Last year alone, it was ~**2042 KB on desktop** and a whopping ~1891 KB on mobile

The number of **resources requested last year were 73 on desktop** and 69 on mobile.

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Let’s dig deeper ⛏️

In 2010-2011, **in average** per page, there were **3 CSS requests**, **2 font requests**, **4 HTML requests**, **42 Image requests** (averaging at ~327 KB), **11 JavaScript requests** (averaging at 133 KB) and **0 requests for video**.

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Last year, **in average** per page, there were **7 CSS requests**, **5 font requests**, **3 HTML requests**, **26 Image requests** (averaging at ~953 KB), **21 JavaScript requests** (averaging at 449 KB) and **2 for video** (averaging at 1592 KB)*.

*Interestingly enough, on mobile the average request for video is 3 with ~1897 KB

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The web has changed.

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How we develop sites has changed.

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How users use the web, has changed as well.

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Performance of websites matter

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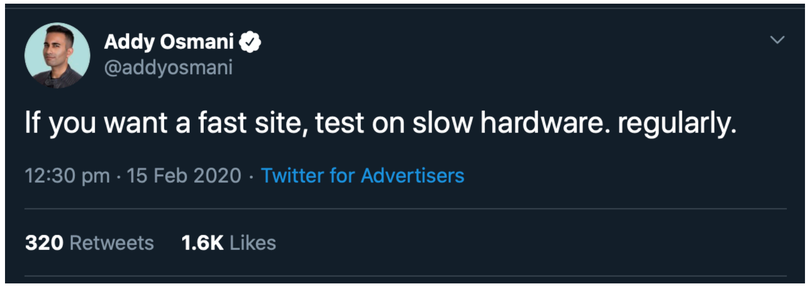
Importance of Web Performance

- Pinterest: 40% reduction in perceived wait time, 15% more signups
- COOK: reduced page load by 850 ms, 7% conversion increase
- BBC: Lost 10% of users for every additional second the site took to load
- DoubleClick: 53% of mobile users leaving if a page took more than 3s to load

Test

Measure

Record



Field tools

- Chrome User Experience Report
- PageSpeed Insights
- Search Console (Core Web Vitals report)
- Web-vitals JavaScript Library

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Lab tools

- Chrome DevTools
- Lighthouse
- WebPageTest
- Web Speed Test for Images

Core Web Vitals

Loading (Largest Contentful Paint)
Interactivity (First Input Delay)*
Visual Stability (Cumulative Layout Shift)

* In lighthouse FID is not present, use Total Blocking Time instead

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Largest Contentful Paint

- How long does it take for the largest, visible element to appear.
  - Images (img and image elements)
  - Video (only when used with a poster)
  - Element that has a background image via url()
  - Block level elements with text, or inline-level text elements

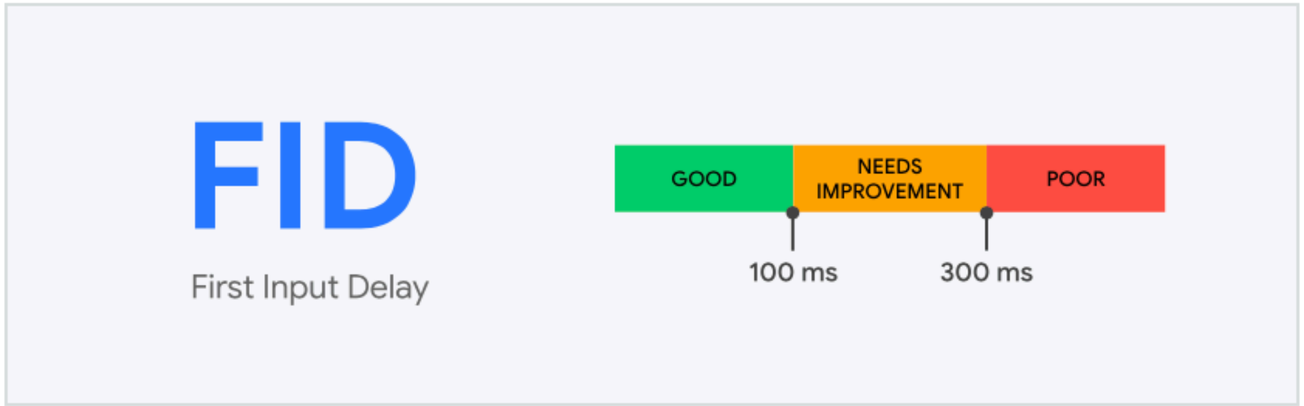
Field

Lab

First Input Delay

- Delta between an input event and when the main thread is idle and is capable of processing the event handler
- Applicable to situations without an event listener as well - form elements, links

Field



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Cumulative Layout Shift

- How much a page “jumps” around

Field

Lab

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How?

- Backend
  - Enable compression
  - HTTP/2
    - HTTP/3
  - Media management
- Frontend
  - Lazy loading
  - Minification
  - Preloading of assets
  - Bundle size management
    - source-map-explorer

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Demo apps

- Lazy loading
  - Images
  - Components
- Font pre-load
- GIFs vs Images vs Videos
- Eliminate unneeded JS/CSS dependencies
- Eliminate unneeded modules

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Tools

- Impact calculator (https://www.thinkwithgoogle.com/feature/testmysite)
- Website Performance Test (https://www.webpagetest.org)
- (Core) Web Vitals
- Media Speed Test (https://webspeedtest.cloudinary.com)
- Page Speed Insights (https://developers.google.com/speed/pagespeed/insights/)
- Lighthouse (Chrome) (https://developers.google.com/web/tools/lighthouse)
- Base (slow) app on GitHub vs Final (fast) app on GitHub
- https://github.com/tpiros/performant-angular-base vs https://github.com/tpiros/performant-angular-final

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🇺🇸 Thank you! 🇺🇸