

WEB PERFORMANCE

HOW TO MEASURE AND IMPROVE IT

ANALYZING AND IMPROVING THE LOADING PERFORMANCE OF LARGE-SCALE WEBSITES ON MOBILE DEVICES

Master's Thesis – Olavi Haapala

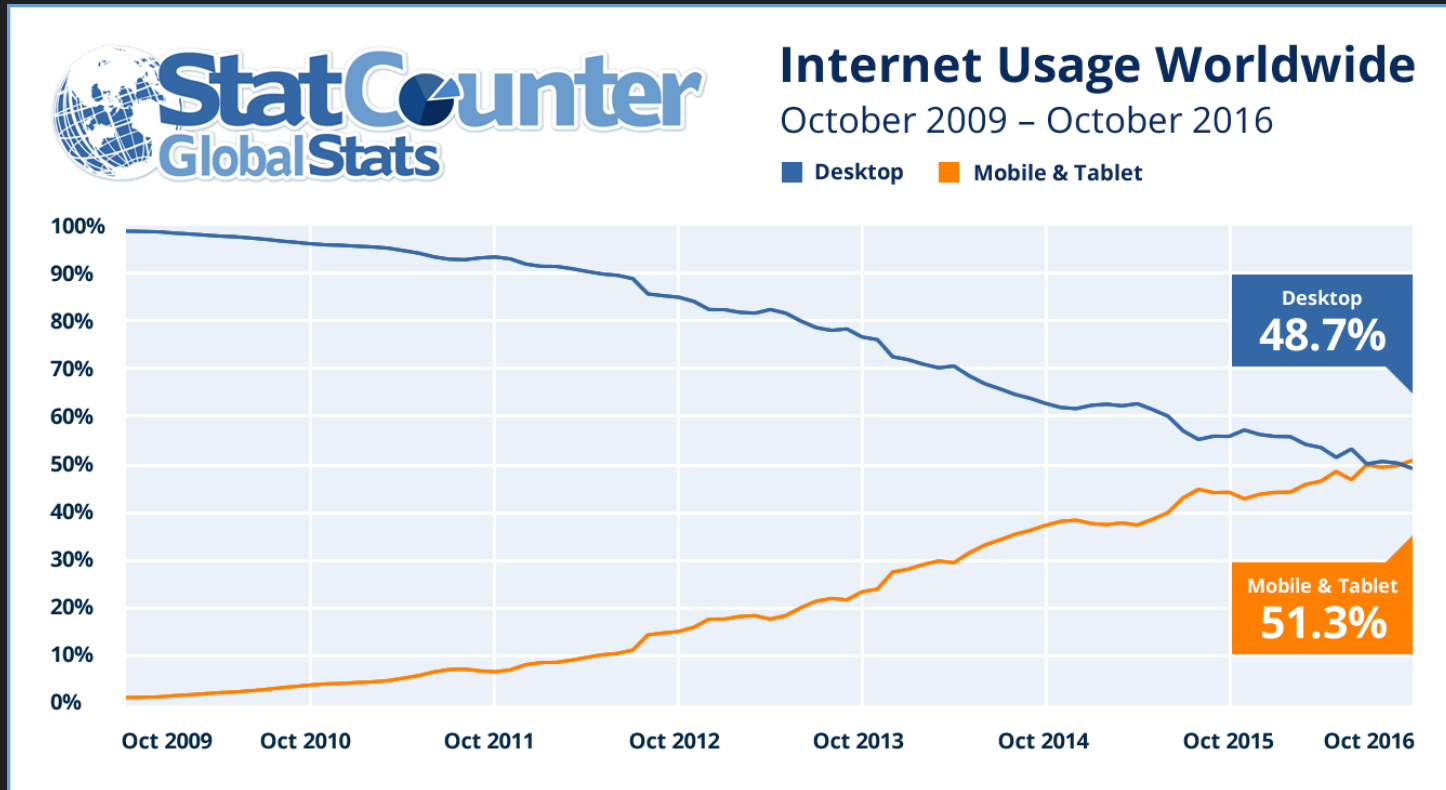
AGENDA

- Motivation
- Scope
- Results & Findings
- Conclusion
- Demo

MOTIVATION



MOBILE & TABLET EXCEEDED DESKTOP



HEAVIER WEBSITES (VS. 2010)

CSS Bytes: ▲ 320%
Font Bytes: ▲ 250%
JS Bytes: ▲ 570%
Image Bytes: ▲ 950%
Total KiloBytes: ▲ 980%

2017

CSS ▲ 15%, Fonts ▲ 10%
JS: ▲ 14%, Total ▲ 12%

SLOW WEBPAGES ON 3G

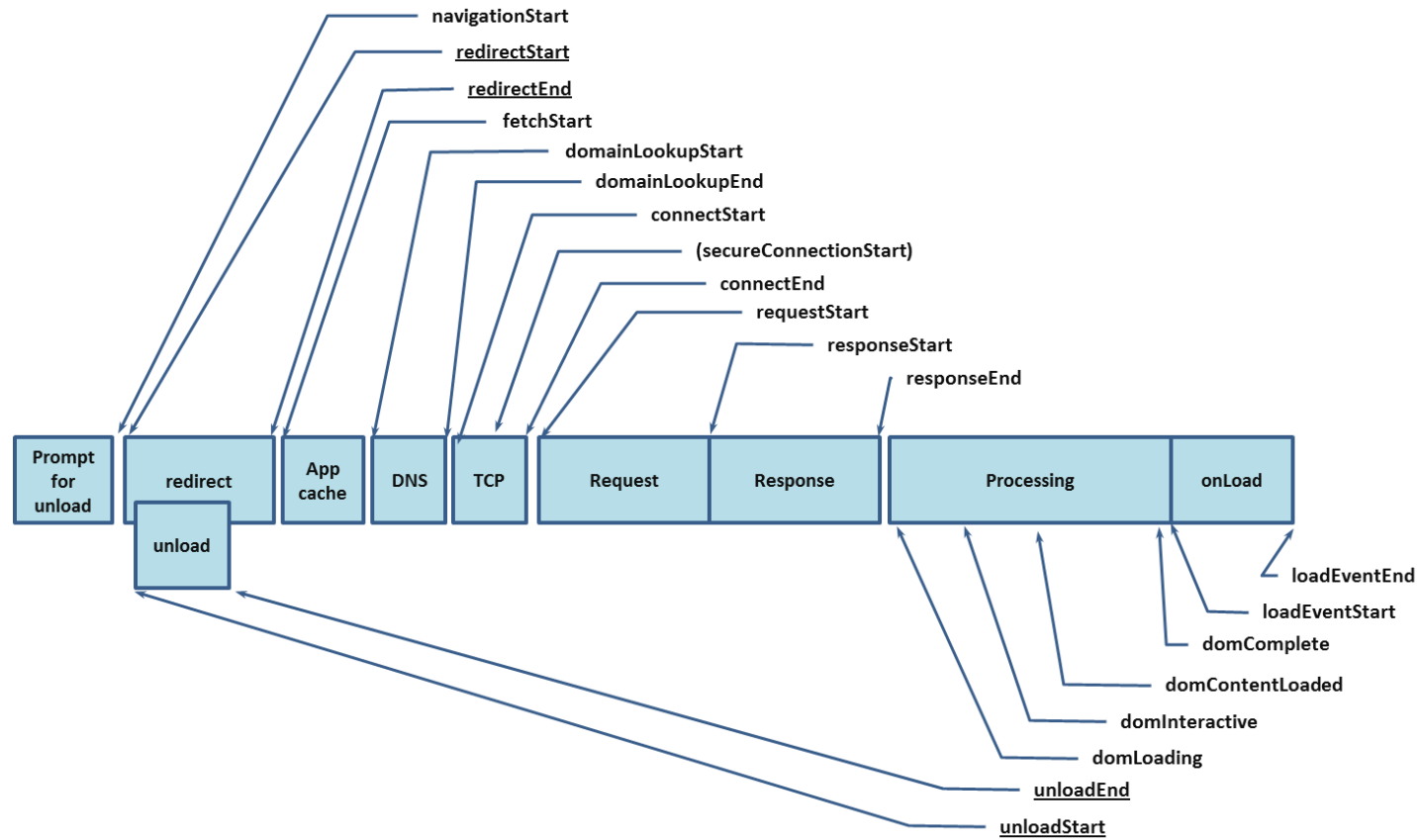
19s

77%

53%

5s → 2X

BROWSER EVENTS



MEASURING WEB PERFORMANCE

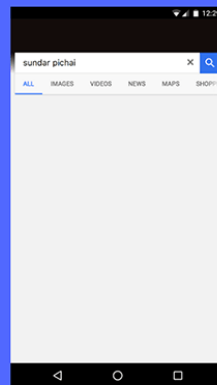
Metrics

Load Time, Fully Loaded, First Byte, Start Render,
Speed Index, First Paint, First Contentful Paint, First
Meaningful Paint, First Interactive, Concisently
Interactive

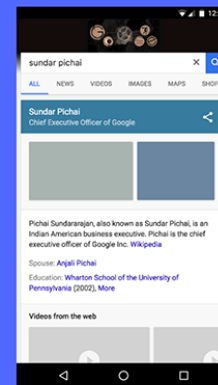
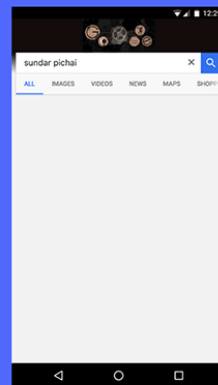
MEASURING WEB PERFORMANCE



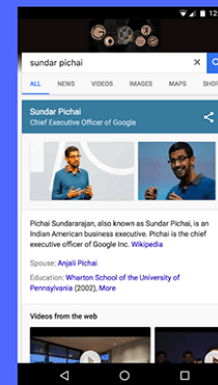
First Paint
(FP)



First Contentful
Paint (FCP)



First Meaningful
Paint (FMP)



Time to
Interactive (TTI)

WHAT SHOULD I MEASURE?

It depends

Try for yourself

```
46 Hero Rendering Times
35 Speed Index
32 Time to First Interactive
15 Start Render
13 First Meaningful Paint
9 First Contentful Paint
7 First Paint
```

WEBPAGES GET SLOWER (VS. 2017)

First Contentful Paint

5.9 seconds ▲ 23%

DOMContentLoaded

7.6 seconds ▲ 27%

Time to First Interactive

10.7 seconds ▲ 6%

Time to Consistently Interactive

14.8 seconds ▲ 22%

HOW USERS FEEL ABOUT DELAYS

- 0.1s
- 0.1s – 1.0s
- 1.0s – 10s

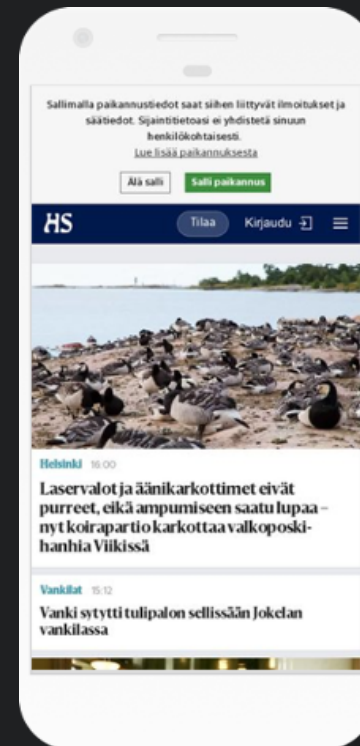
SCOPE

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SCOPE

- Ilta-Sanomat
- Helsingin Sanomat
- Front end performance
- Focus on mobile

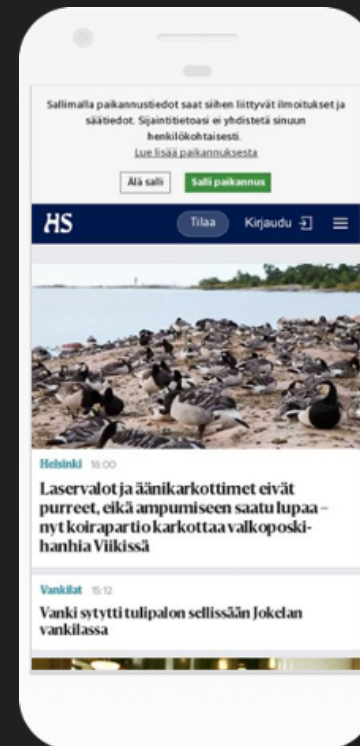


SELECTED TOOLS

- [WebPageTest](#)
- [Lighthouse](#)
- [PageSpeed Insights](#)
- [Test My Site](#)
- [Developer tools](#)
- [Custom setup](#)

PROGRESSIVE WEB APPLICATIONS

- App manifest
- Service Worker
- Precached assets
- Offline support
- Example: Twitter Lite



RESULTS & FINDINGS

https://www.is.fi/



5s

Loading time on 3G: **Good**

19%

Est. Visitor loss
(Due to loading time)

Find out how to speed up your site to
keep more visitors.



https://www.hs.fi/



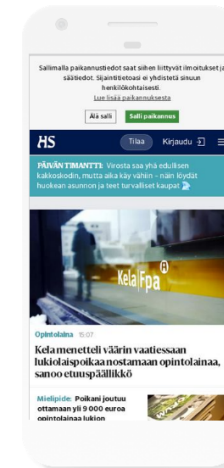
7s

Loading time on 3G: **Fair**

26%

Est. Visitor loss
(Due to loading time)

Find out how to speed up your site
to keep more visitors.



Test My Site results on March 5 2018

FINDINGS FOR IS & HS

- Heavy on assets
- A lot done right
- 3rd party assets and content
- Improvements possible

JAVASCRIPT OPTIMIZATION RESULTS

Page Load Time

17.0% (9.43s -> 7.83s)

DOMContentLoaded

23% (5.50s -> 4.25s)

PROTOTYPE PWA PERFORMANCE IMPACT

PWA REPEAT VIEW PERFORMANCE

	Master	PWA	Improvement	%
Speed Index	3058	3024	34	1.11%
Start Render	2.478s	2.431s	0.061s	2.46%
First Interactive	7.236s	6.795s	0.125s	1.73%
Load Time	6.730s	6.510s	0.117s	1.74%

CONCLUSION

RECOMMENDATIONS

- Focus on performance
- Continuous monitoring
- Small improvements
- Prioritize visible content
- Lazyload when possible
- PWA: it depends

Demo time

If we have time...

Links

- Try which event you should focus on
- SpeedCurve data for top sites
- A large collection of interesting links
- Follow me on Twitter

Thank you!

Questions?

futurice

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