

PUTTING SERVICE WORKERS IN PRODUCTION

Front-end Lisbon, 6 April 2017

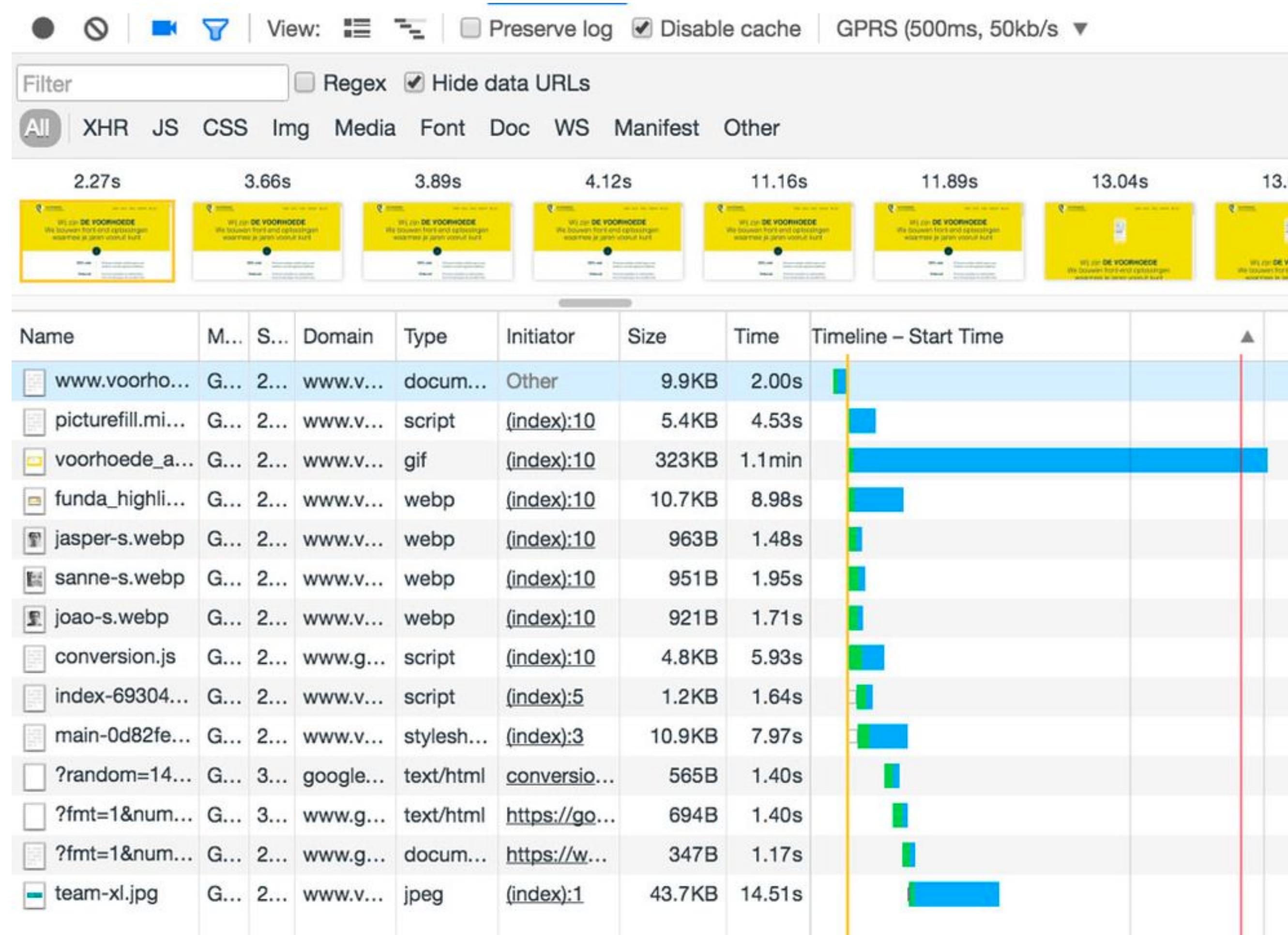


@declanrek

VOORHOEDE



VOORHOEDE.NL



[result on voorhoede.nl](http://result.on/voorhoede.nl)

VOORHOEDE.NL

PageSpeed Insights [G+](#)

[ANALYZE](#)

Mobile Desktop

100 / 100 Speed

Congratulations! No issues found.

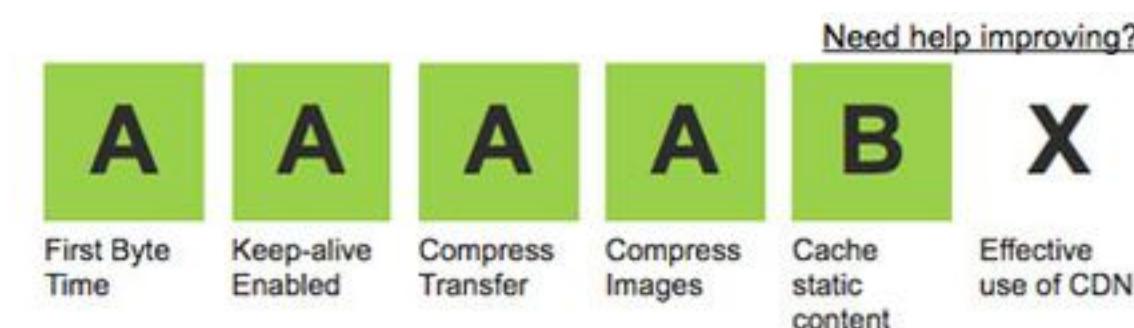
Avoid landing page redirects
Your page has no redirects. Learn more about [avoiding landing page redirects](#).

Eliminate render-blocking JavaScript and CSS in above-the-fold content
You have no render-blocking resources. Learn more about [removing render-blocking resources](#).



Web Page Performance Test for <https://www.voorhoede.nl>

From: Amsterdam, NL - IISpeed - Chrome - Cable
7/13/2016, 6:02:33 PM



[Summary](#) [Details](#) [Performance Review](#) [Content Breakdown](#) [Domains](#) [Screen Shot](#)

Tester: VPS16230-93.191.133.233 [Raw page data](#) - [Raw object data](#)
[Re-run the test](#) [Export HTTP Archive \(.har\)](#) [View Test Log](#)

	Load Time	First Byte	Start Render	Speed Index	DOM Elements	Document Complete			Fully Loaded			
						Time	Requests	Bytes In	Time	Requests	Bytes In	Cost
First View	1.452s	0.279s	0.609s	693	197	1.452s	21	592 KB	1.503s	22	597 KB	\$---
Repeat View	1.028s	0.186s	0.609s	733	191	1.028s	4	38 KB	1.028s	4	38 KB	

[**result on voorhoede.nl**](#)

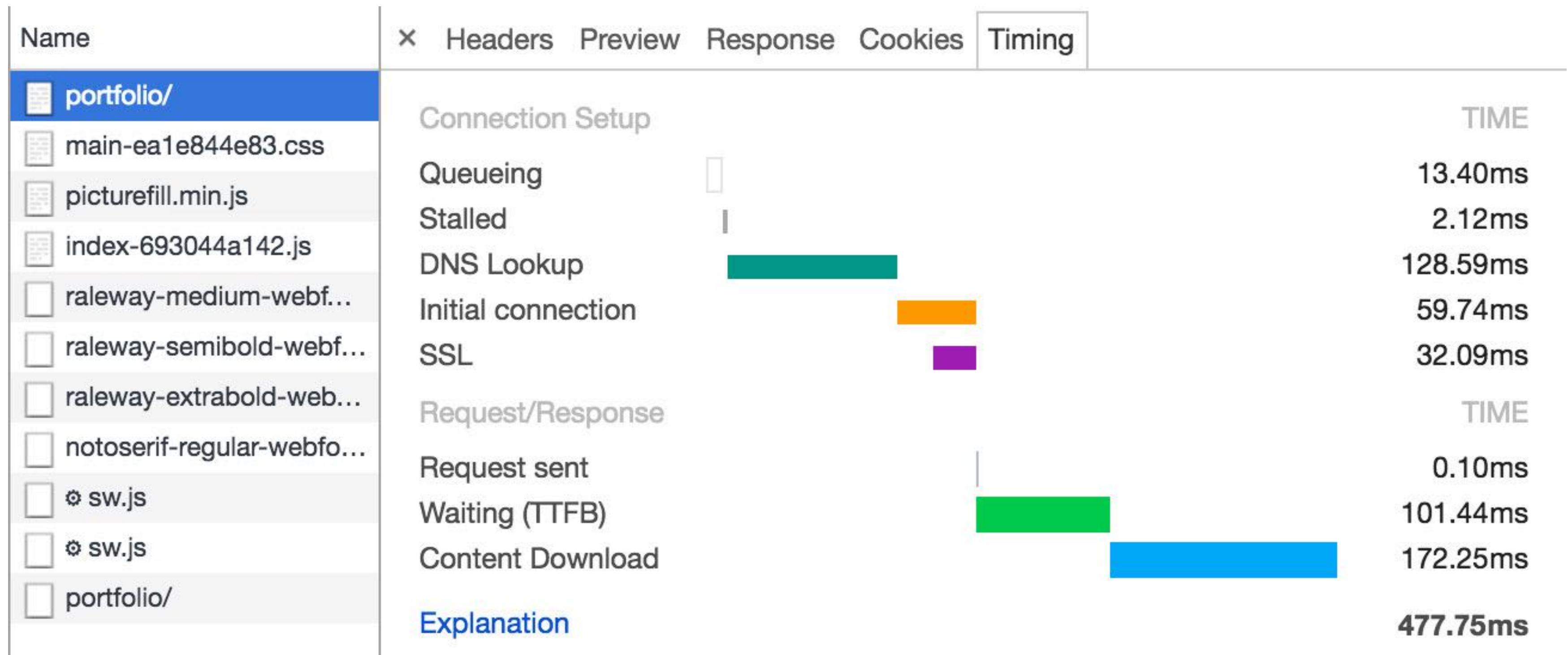


Udacity - Offline Web Applications

VOORHOEDE.NL

Name	Stat...	Protocol	Type	Size	Time
portfolio/	200	http/1.1	document	17.1KB	75ms
main-4824f5ea59.css	200	http/1.1	stylesheet	(from cache)	4ms
picturefill.min.js	200	http/1.1	script	(from cache)	5ms
analytics.js	200	quic/1+s...	script	(from cache)	5ms
conversion.js	200	quic/1+s...	script	(from cache)	0ms
index-10668491df.js	200	http/1.1	script	(from cache)	3ms
data:image/svg+xml;...	200	data	svg+xml	(from cache)	0ms
raleway-extrabold-webfont.woff2	200	http/1.1	font	(from cache)	0ms
raleway-semibold-webfont.woff2	200	http/1.1	font	(from cache)	0ms
raleway-medium-webfont.woff2	200	http/1.1	font	(from cache)	0ms
raleway-light-webfont.woff2	200	http/1.1	font	(from cache)	0ms
notoserif-regular-webfont.woff2	200	http/1.1	font	(from cache)	0ms
notoserif-italic-webfont.woff2	200	http/1.1	font	(from cache)	0ms

VOORHOEDE.NL



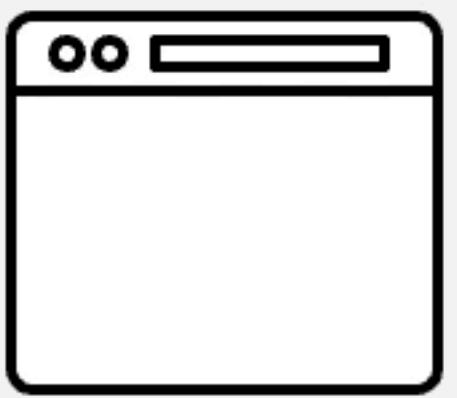
Cache-Control: max-age=300

A network proxy in your
browser?

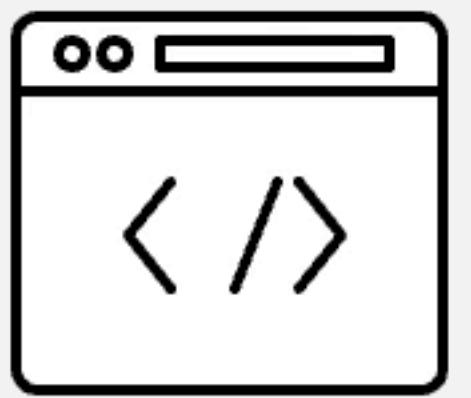
THE SERVICE WORKER



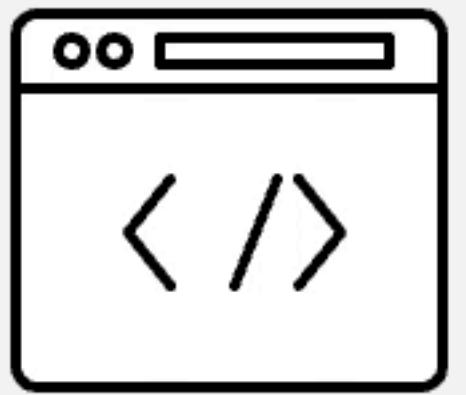
INITIAL PAGE LOAD



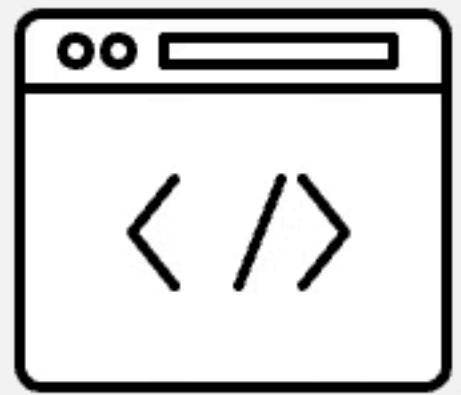
REGISTER SERVICE WORKER



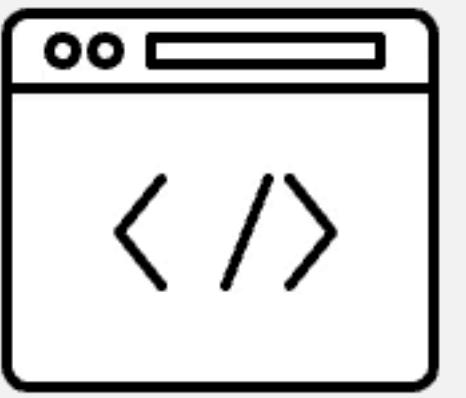
SERVICE WORKER AS PROXY



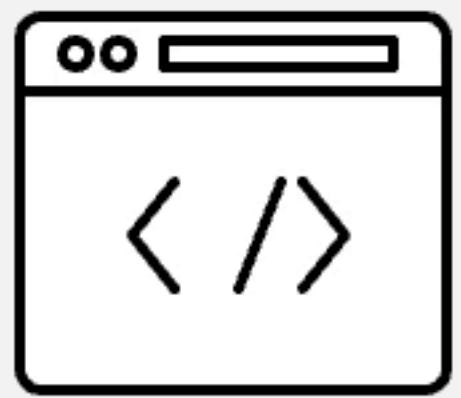
HIJACK FETCH



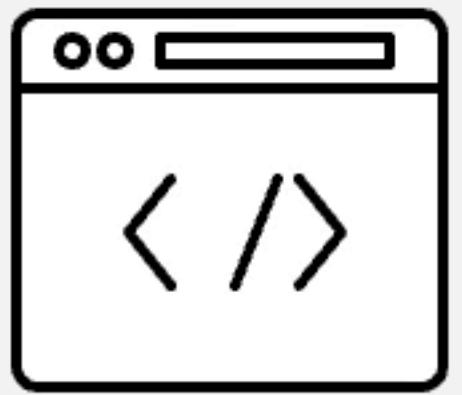
CACHE ON INSTALL



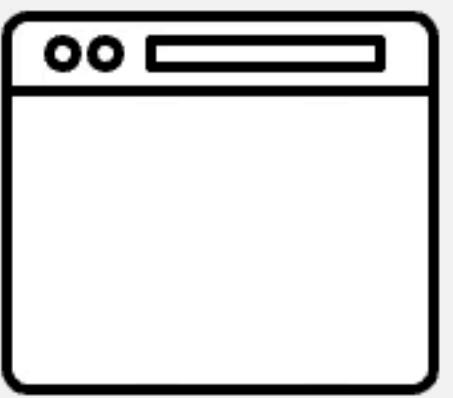
CACHE ON FETCH



SERVE FROM CACHE



UPDATE SERVICE WORKER



```
{  
    ...  
    "/en/": "1db4c16510",  
    "/en/portfolio/": "2ab4423f75",  
    "/en/portfolio/a-brand-new-funda/": "7fce515b45",  
    "/en/portfolio/drop-and-fly/": "acafe43dac",  
    ...  
}
```

```
self.addEventListener('fetch', event => {
  const request = event.request;
  if (isHtmlGetRequest(request)) {
    event.respondWith(
      getHtmlFile(request)
        .catch(() => getFallbackPage(request))
    )
  }
}) ;
```

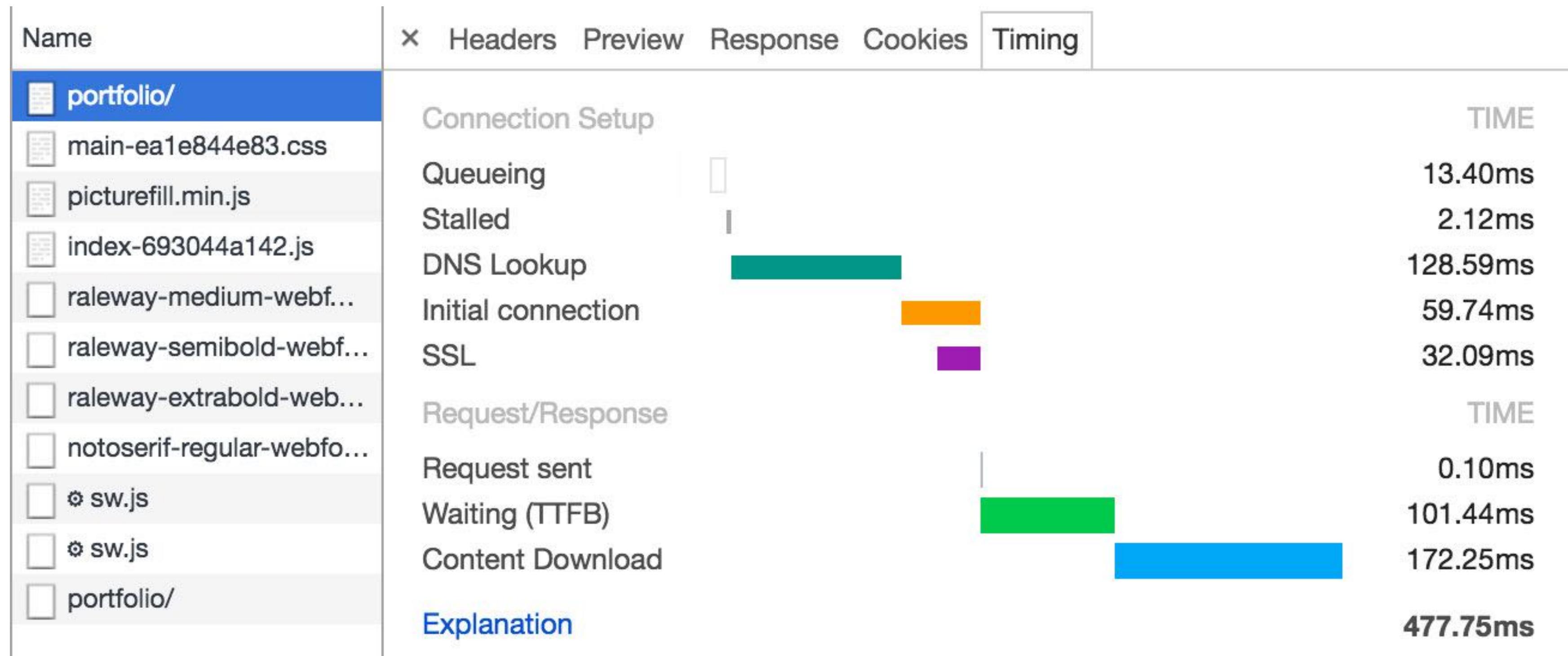
```
function getHtmlFile(request) {
  const cacheName = HTML_MAPPING[request.url];
  return caches.open(cacheName)
    .then(cache => cache.match(request.url))
    .then(response => response ? response : fetchAndCache(request));
}
```

```
const EXPECTED_CACHES =
[ ..., "1db4c16510", "2ab4423f75", "7fce515b45", "acafe43dac", ...]

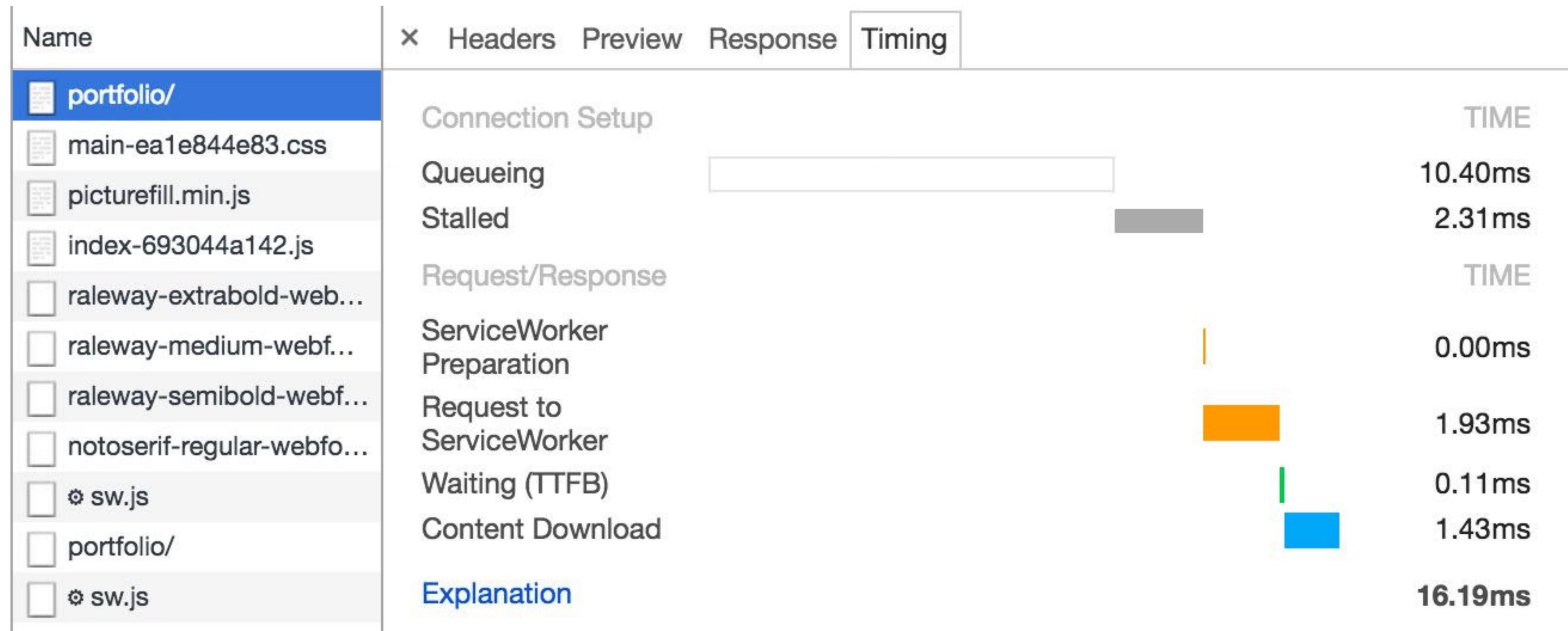
self.addEventListener('activate', event => {
  event.waitUntil(caches.keys().then(cacheNames => {
    const outdatedCaches = cacheNames
      .filter(cacheName => !EXPECTED_CACHES.includes(cacheName));

    return Promise.all(outdatedCaches.map(cacheName => {
      return caches.delete(cacheName)
    }))
  })
}).then(() => self.clients.claim());
});
```

FROM



TO



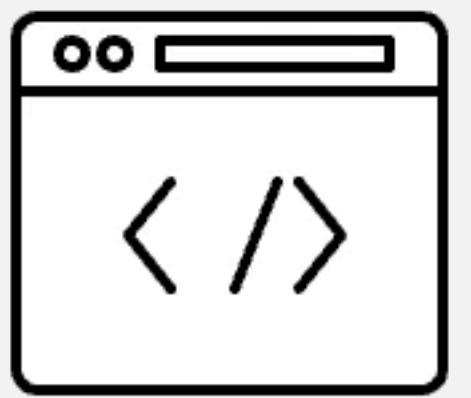
CACHING STRATEGIES



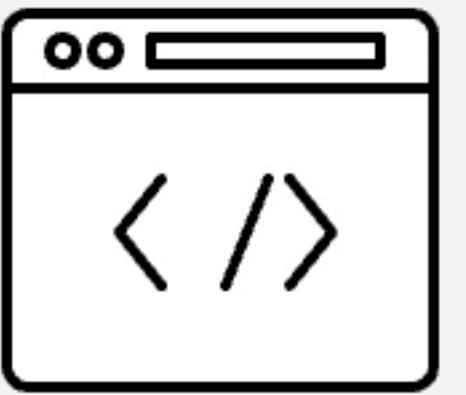
PRECACHING

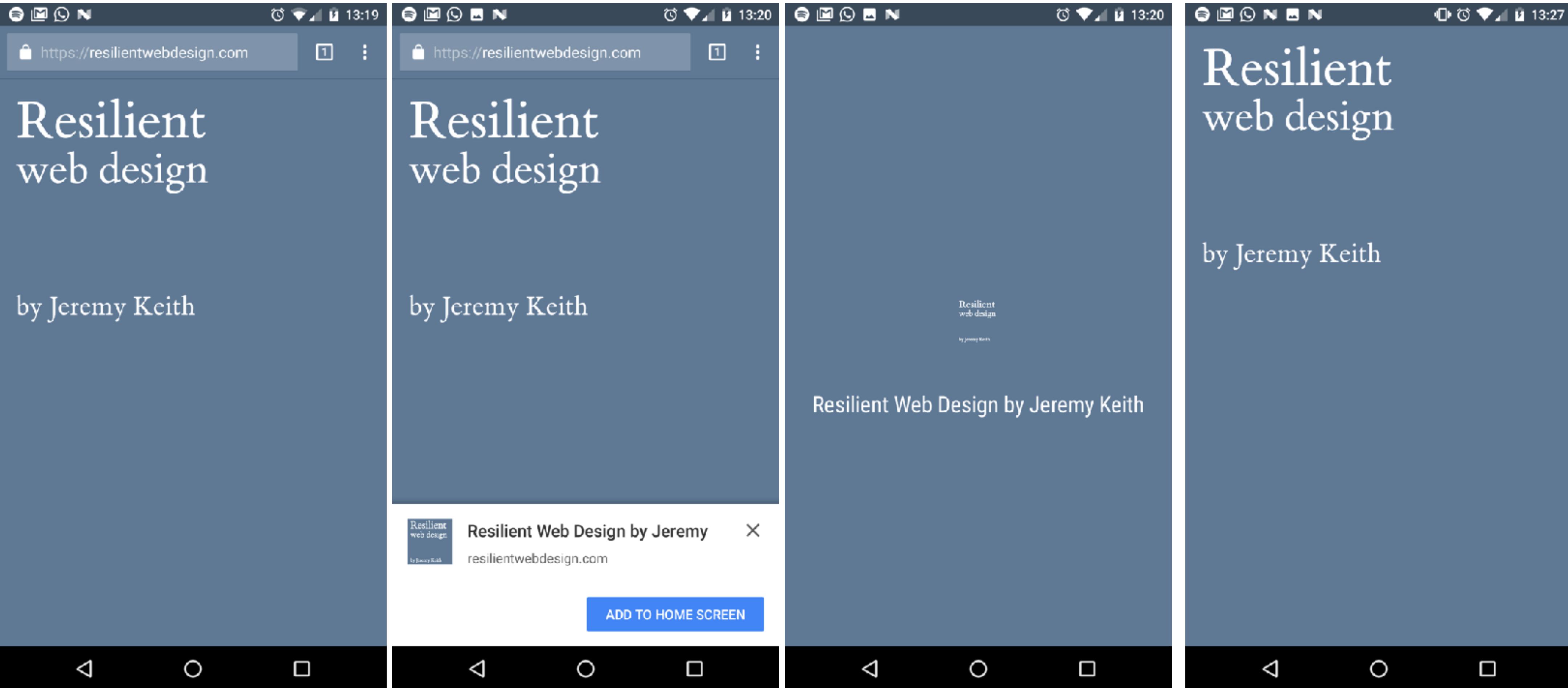


REGISTER SERVICE WORKER



CACHE ON INSTALL



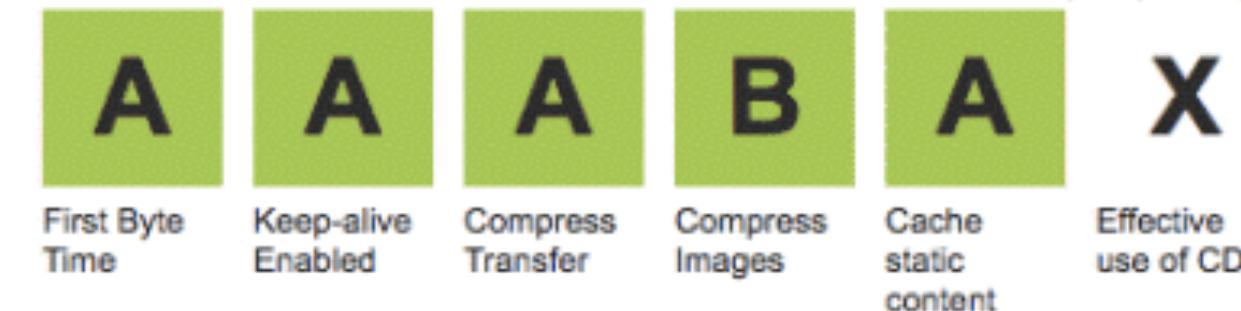


[HOME](#)[TEST RESULT](#)[TEST HISTORY](#)[FORUMS](#)[DOCUMENTATION](#)[ABOUT](#)

Web Page Performance Test for

<https://resilientwebdesign.com/>

From: Dulles, VA - Chrome - Cable
11/01/2017 à 21:42:44

[Summary](#)[Details](#)[Performance Review](#)[Content Breakdown](#)[Domains](#)[Screen Shot](#)

Tester: VM2-07-192.168.10.75

First View only

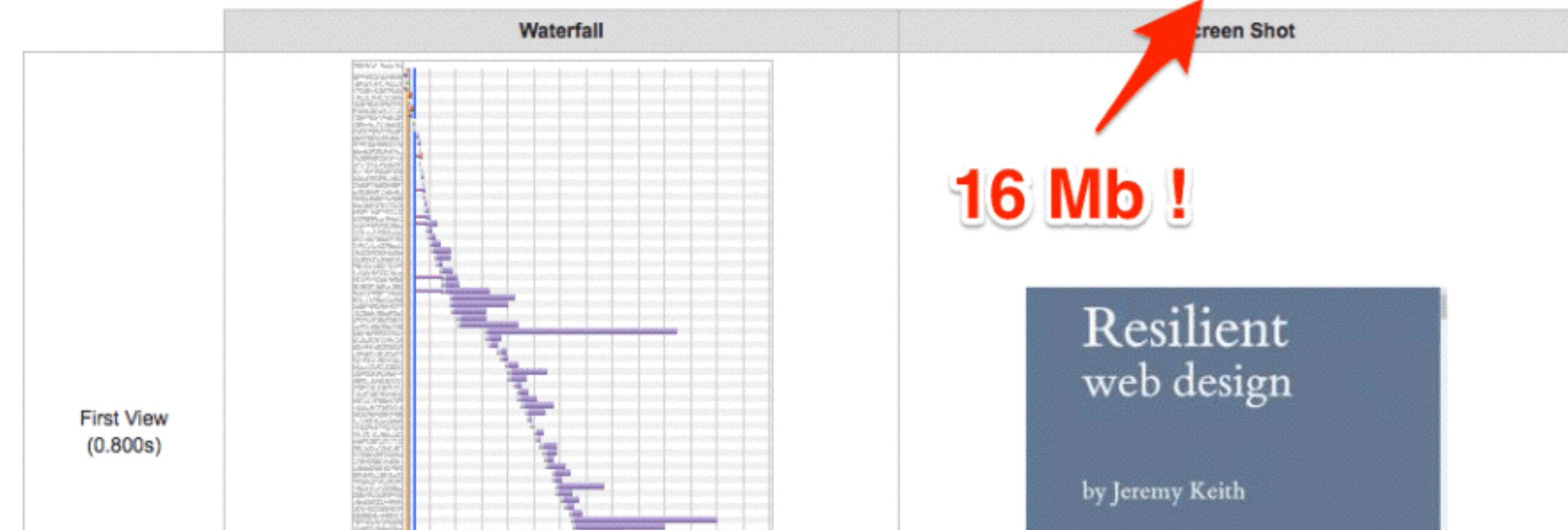
[Re-run the test](#)

[Raw page data](#) - [Raw object data](#)

[Export HTTP Archive \(.har\)](#)

[View Test Log](#)

Document Complete							Fully Loaded						
Load Time	First Byte	Start Render	Speed Index	DOM Elements	Time	Requests	Bytes In	Time	Requests	Bytes In	Certificates	Cost	
0.800s	0.191s	0.681s	684	225	0.800s	9	114 KB	28.066s	99	15,883 KB	19 KB	\$\$\$\$\$	



Nicolas Hoizey on precaching

PRECACHING

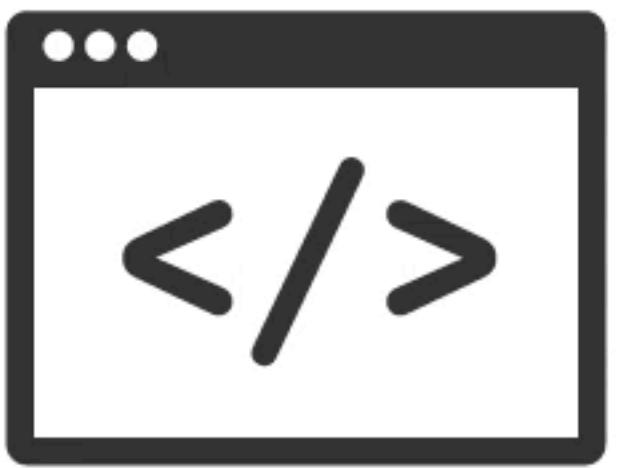


We use precaching for **offline**
HTML, **main css** and **main js**

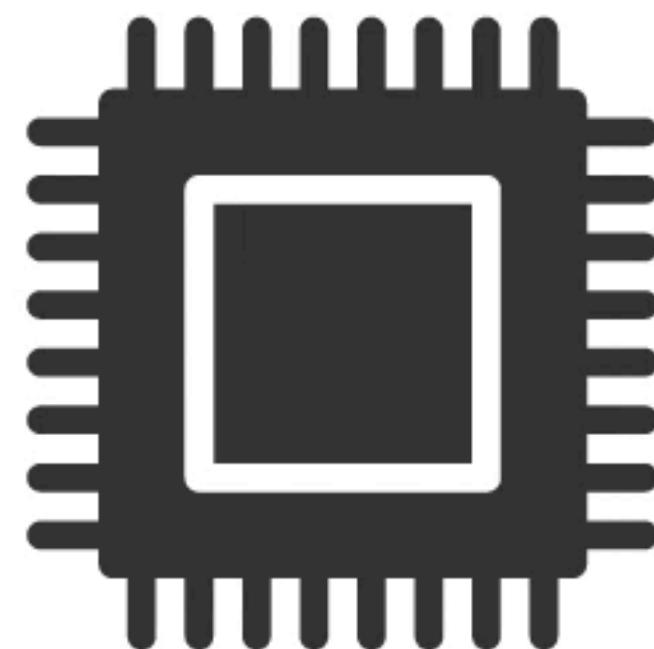
RUNTIME CACHING



CACHE ONLY



Page

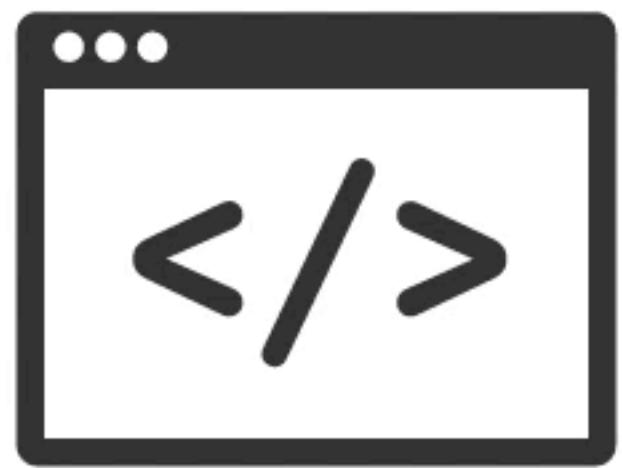


ServiceWorker

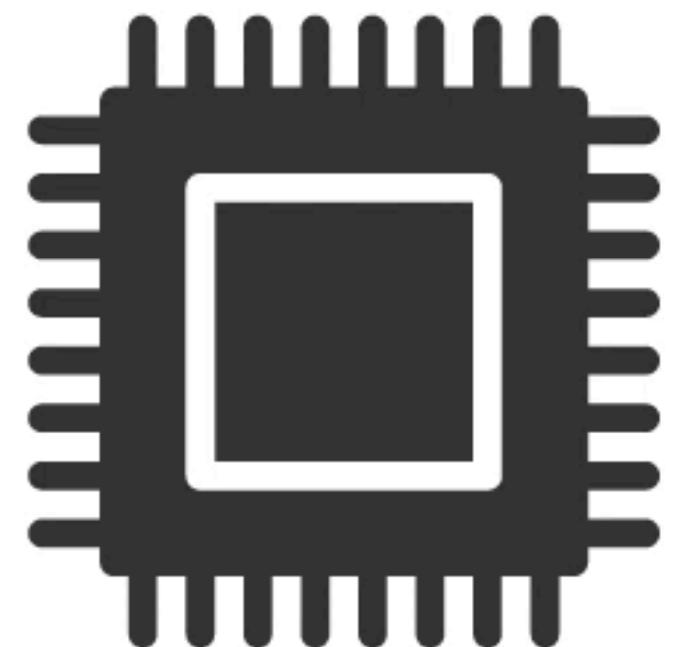


Cache

NETWORK ONLY



Page

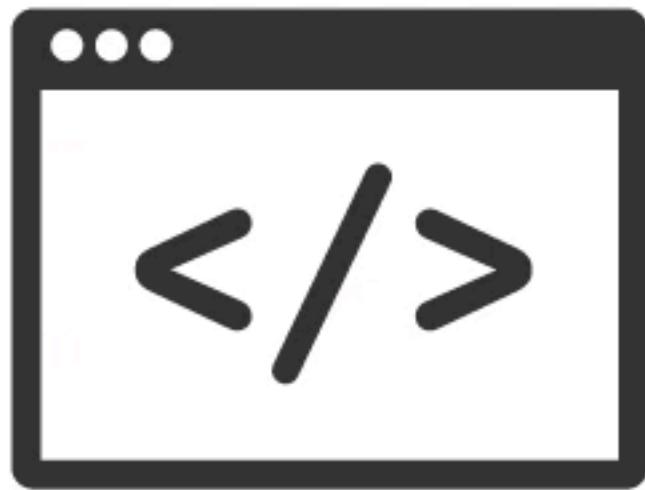


ServiceWorker



Network

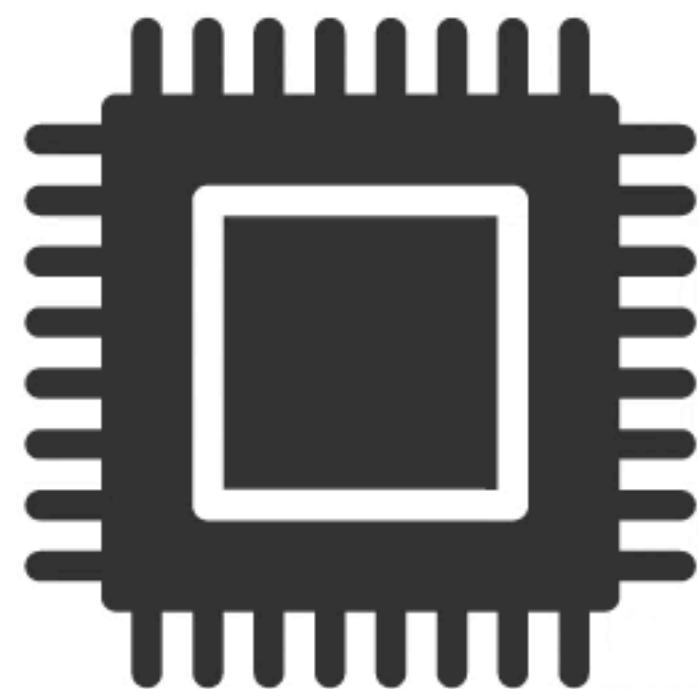
CACHE FIRST



Page



Network

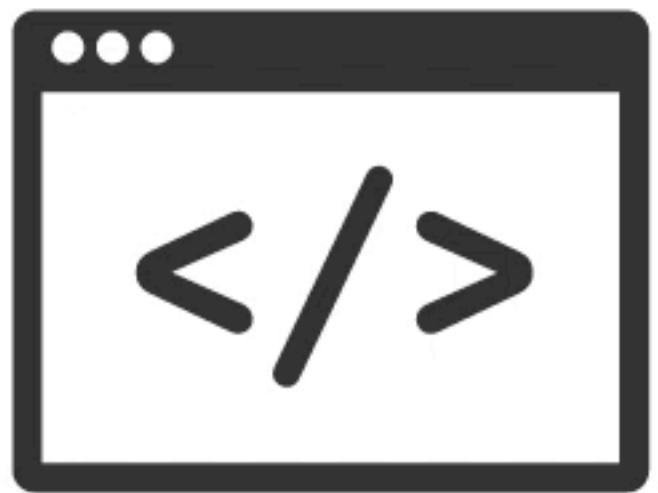


ServiceWorker



Cache

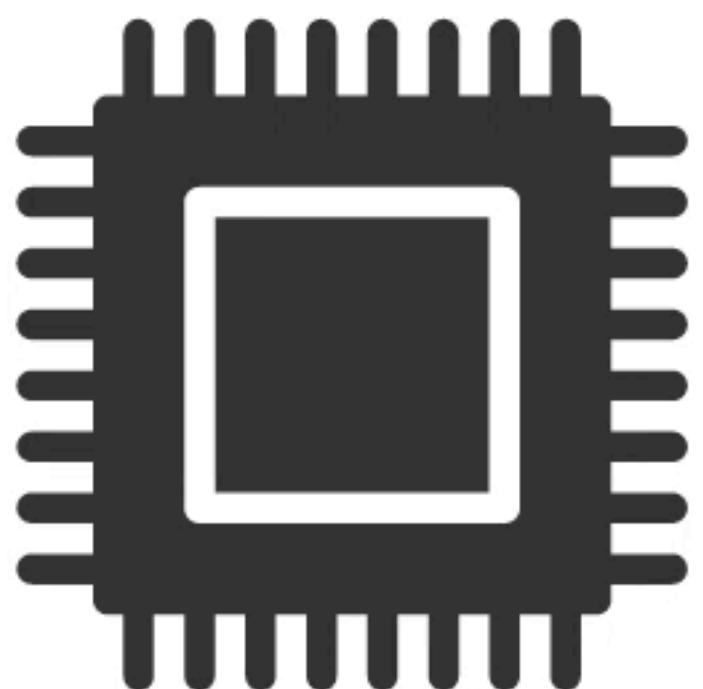
NETWORK FIRST



Page



Cache

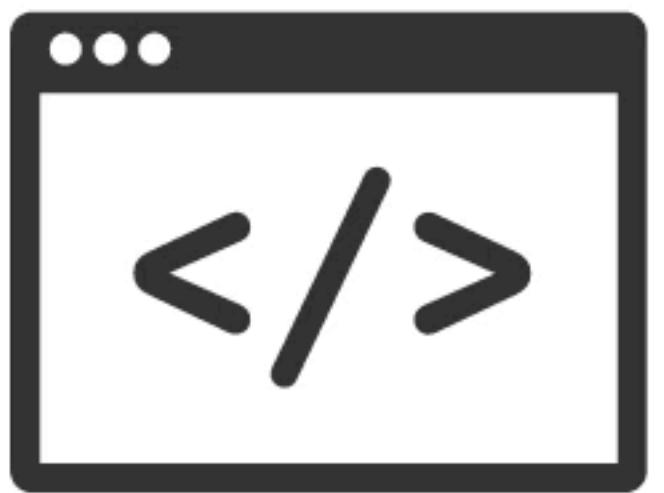


ServiceWorker

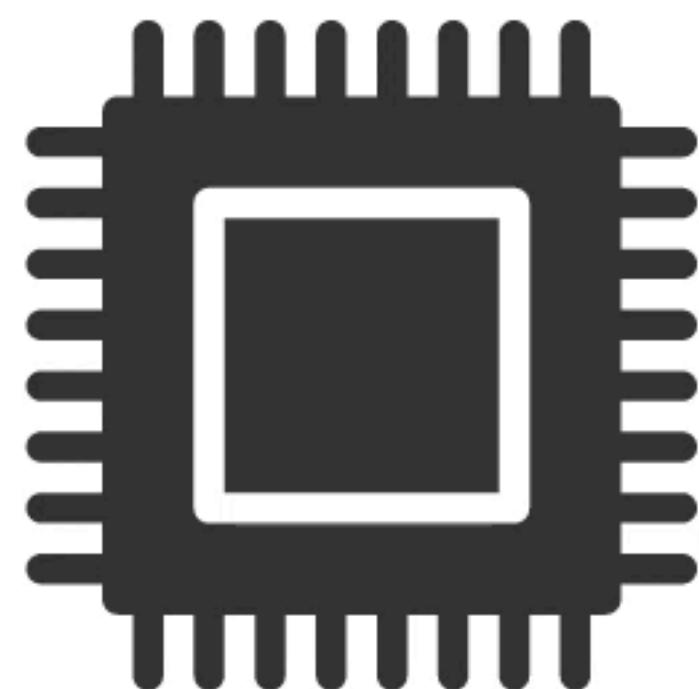


Network

CACHE & NETWORK RACE



Page



ServiceWorker

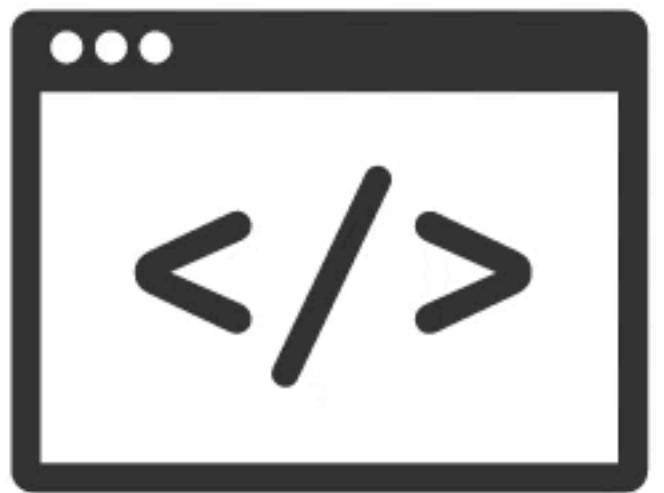


Cache



Network

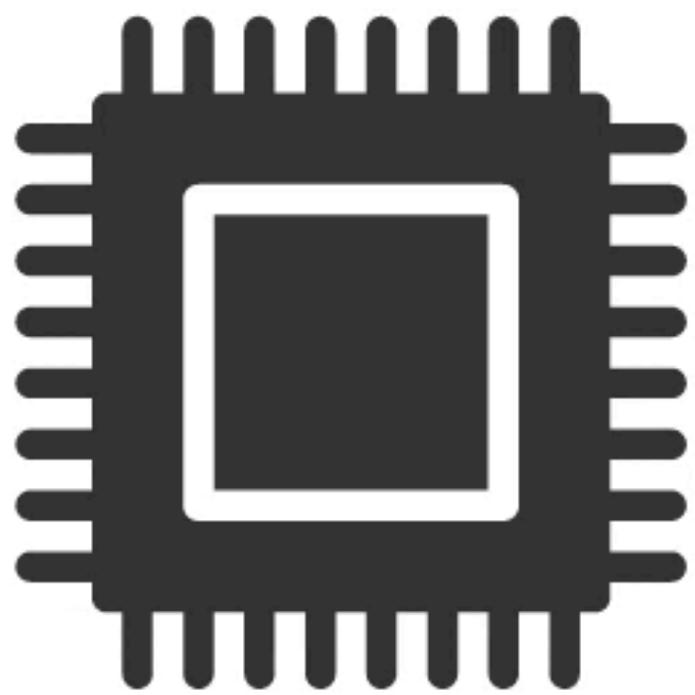
STALE WHILE REVALIDATE



Page



Cache

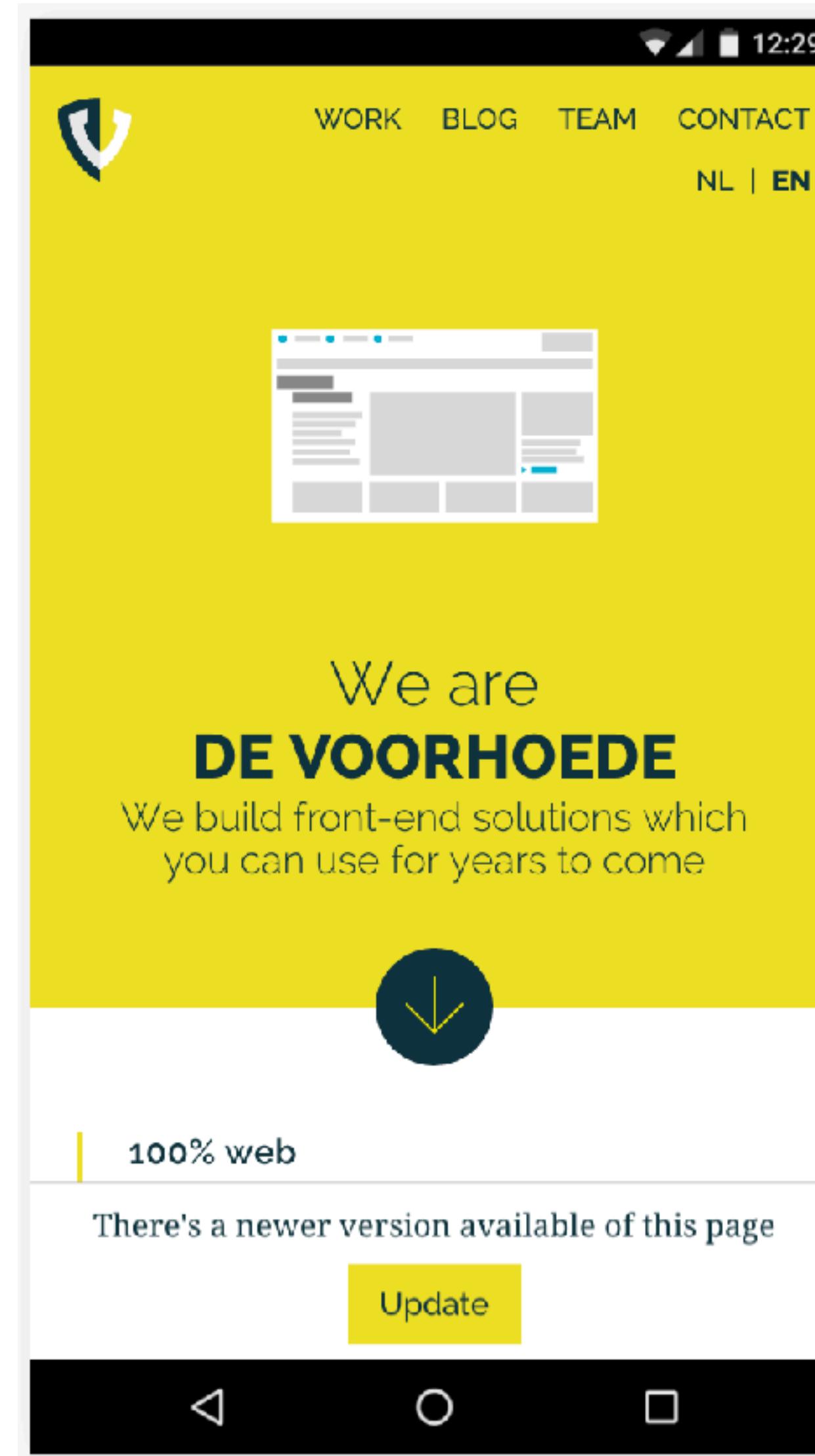


ServiceWorker

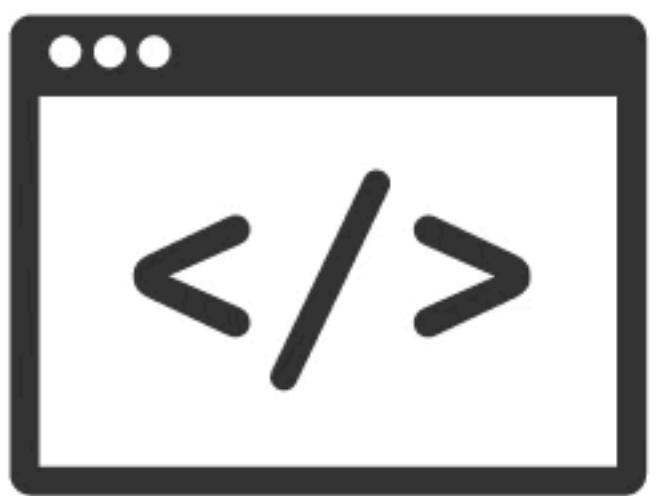


Network

STALE WHILE REVALIDATE



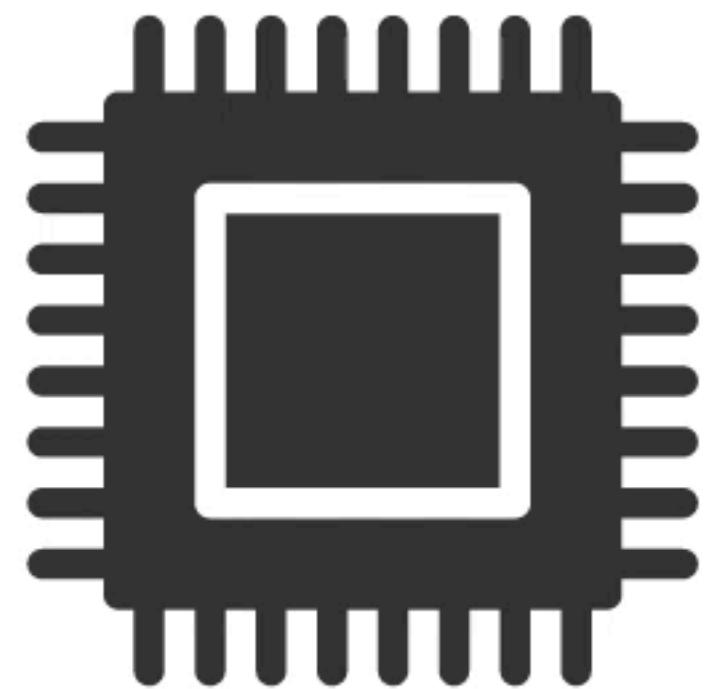
GENERIC Fallback



Page



Cache



ServiceWorker



Network

FULL PAGE CACHING



FULL PAGE CACHING PROS

Service Worker simplicity

Minimal deployment overhead

No content duplication

Works well with multiple layouts

FULL PAGE CACHING CONS

Cache overhead

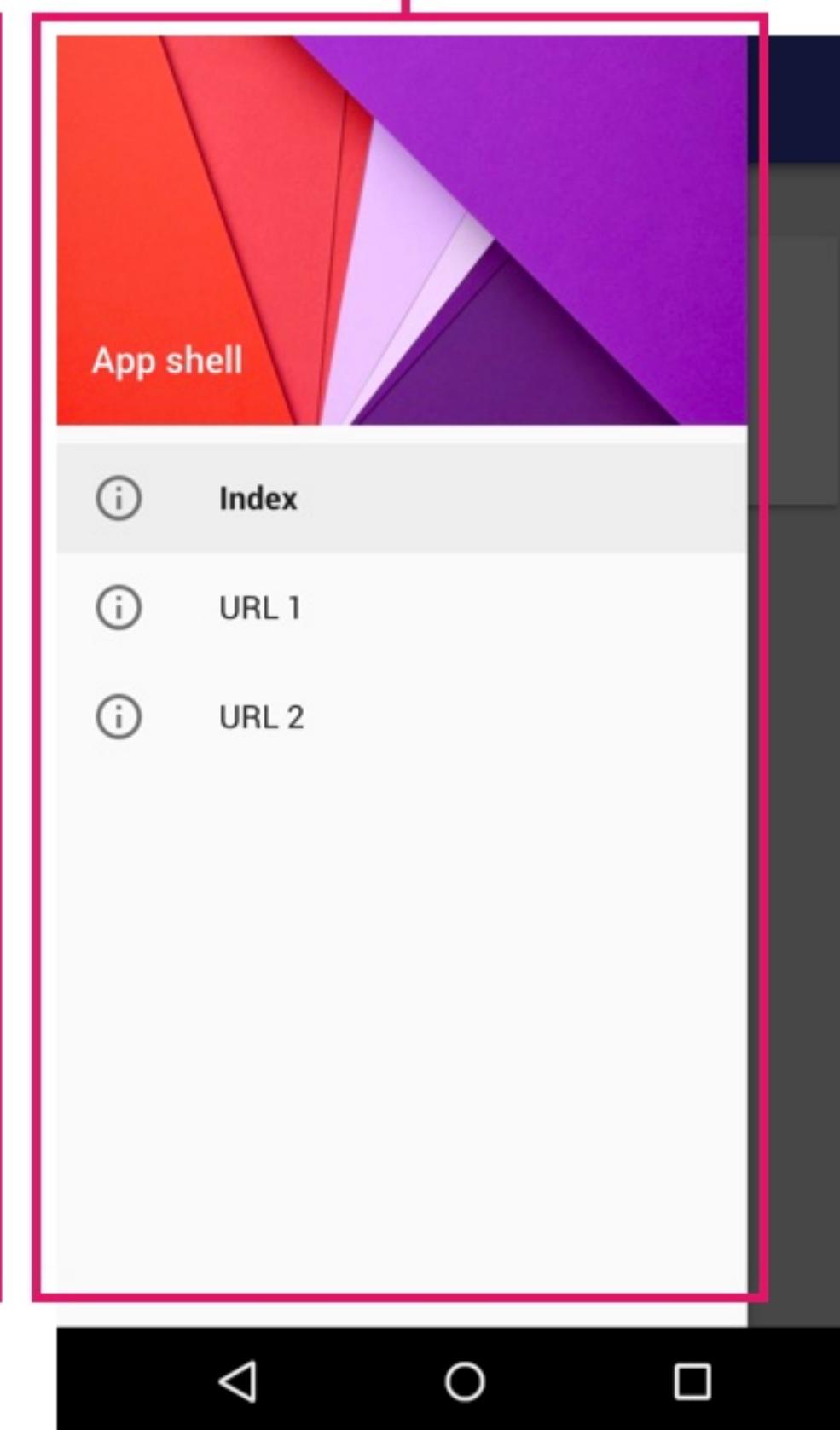
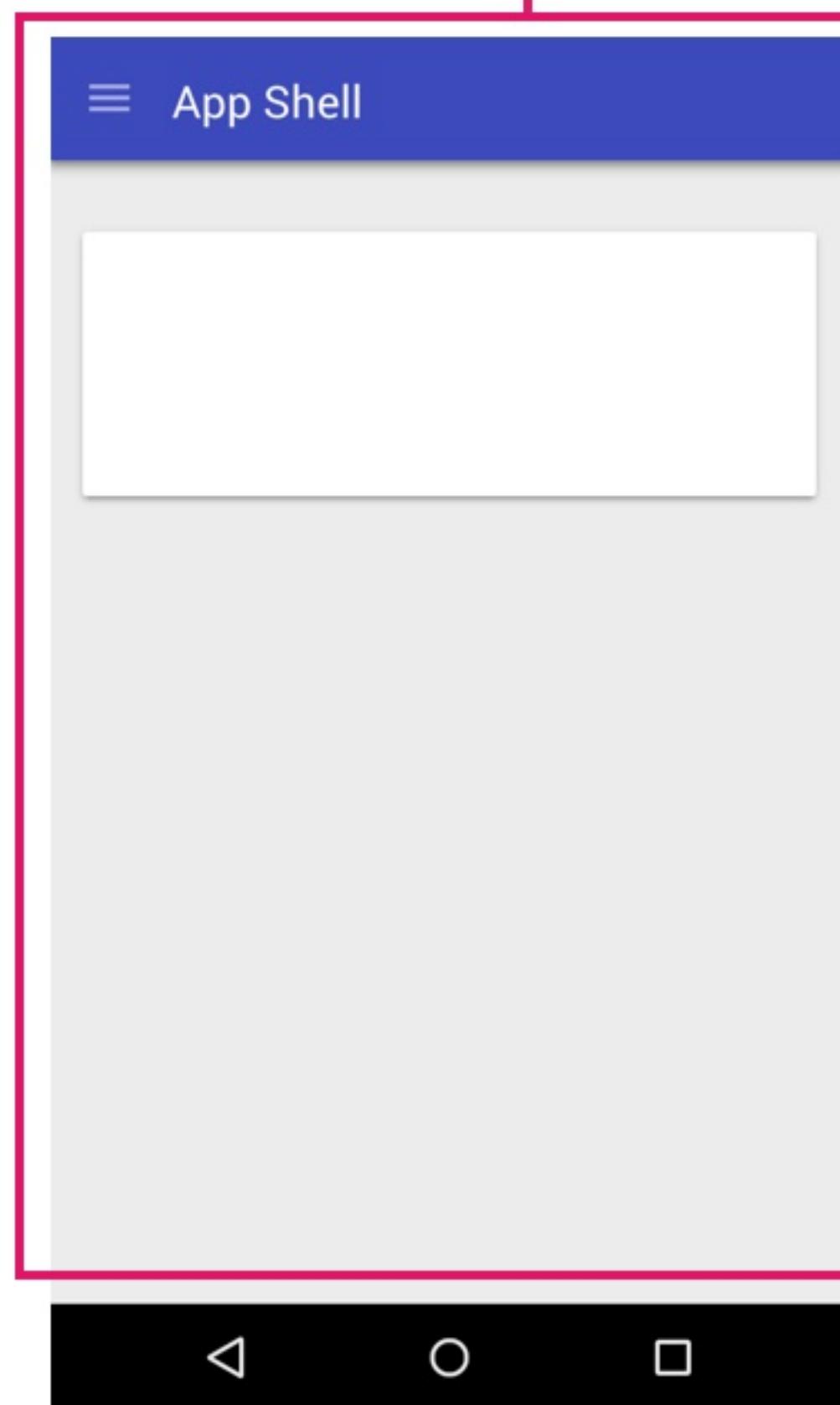
Messy updates

APP SHELL



APP SHELL

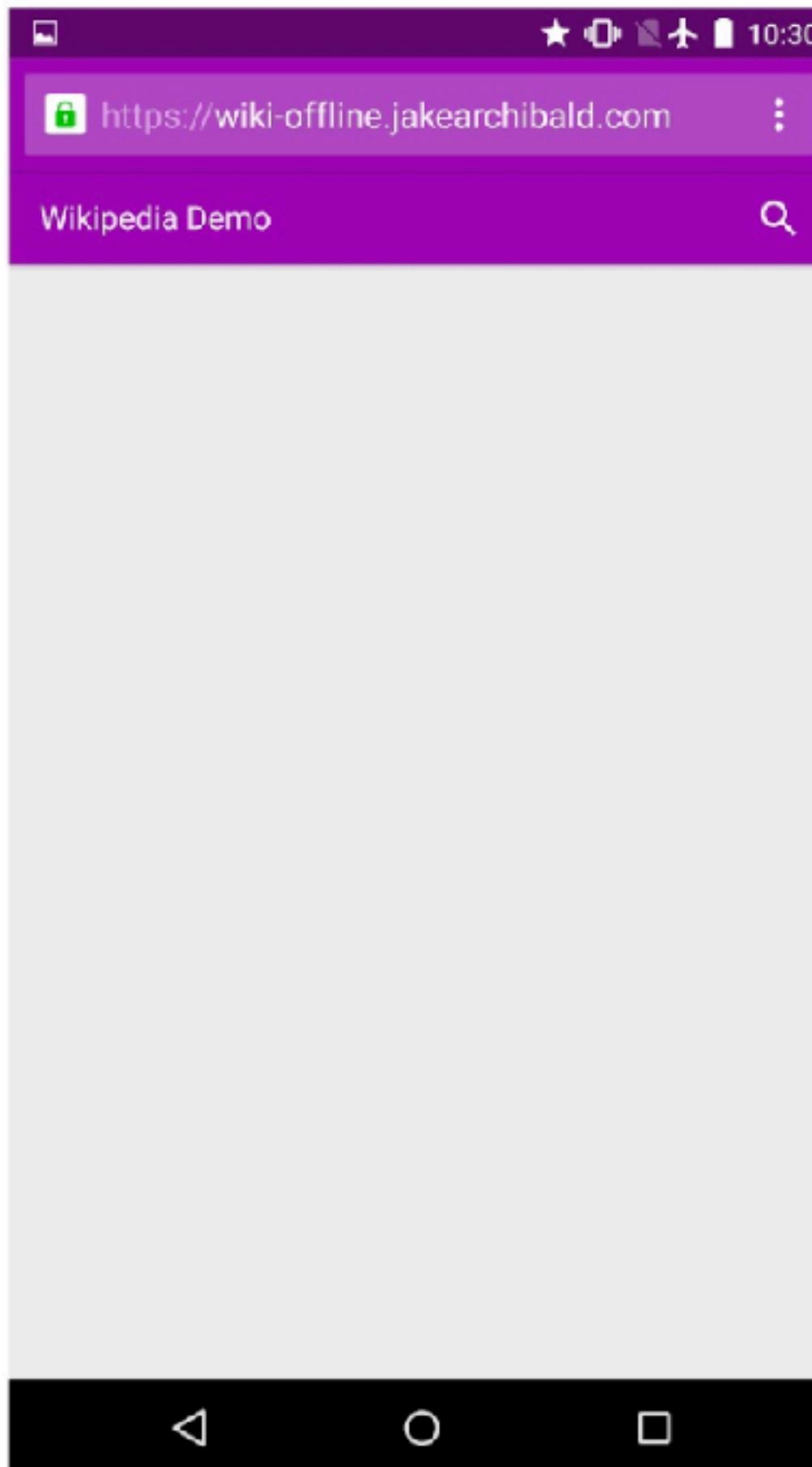
application shell



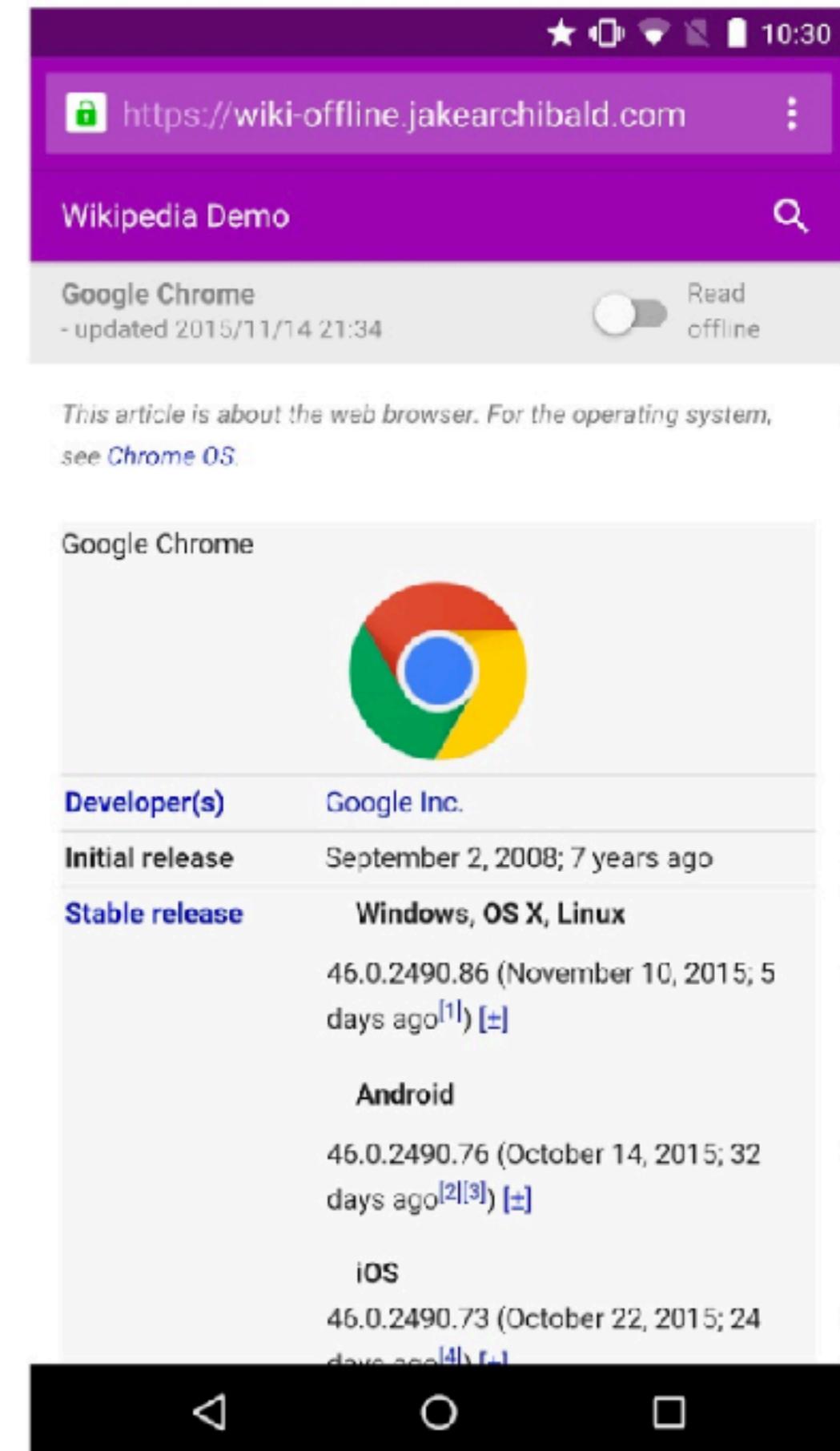
content



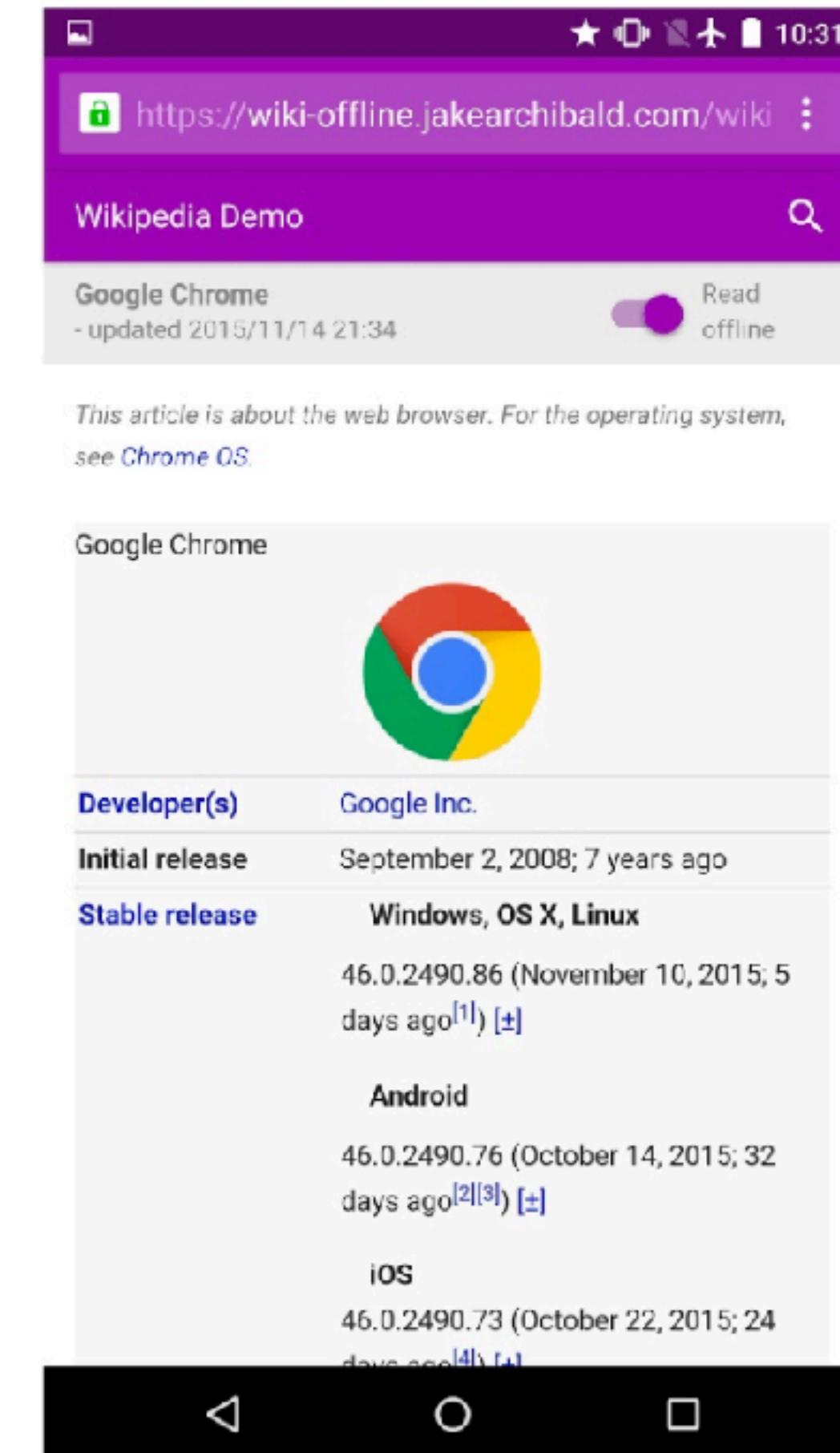
APP SHELL



Cached application shell



Content dynamically loaded in



Content can also be cached for offline viewing

developers.google.com/web/updates/2015/11/app-shell

APP SHELL PROS

Cached shell loads instant on repeat view

Clean updates

Low overhead precaching

APP SHELL CONS

Routing logic in your service worker(e.g. don't use app shell for page x, use app shell2 for page Y)

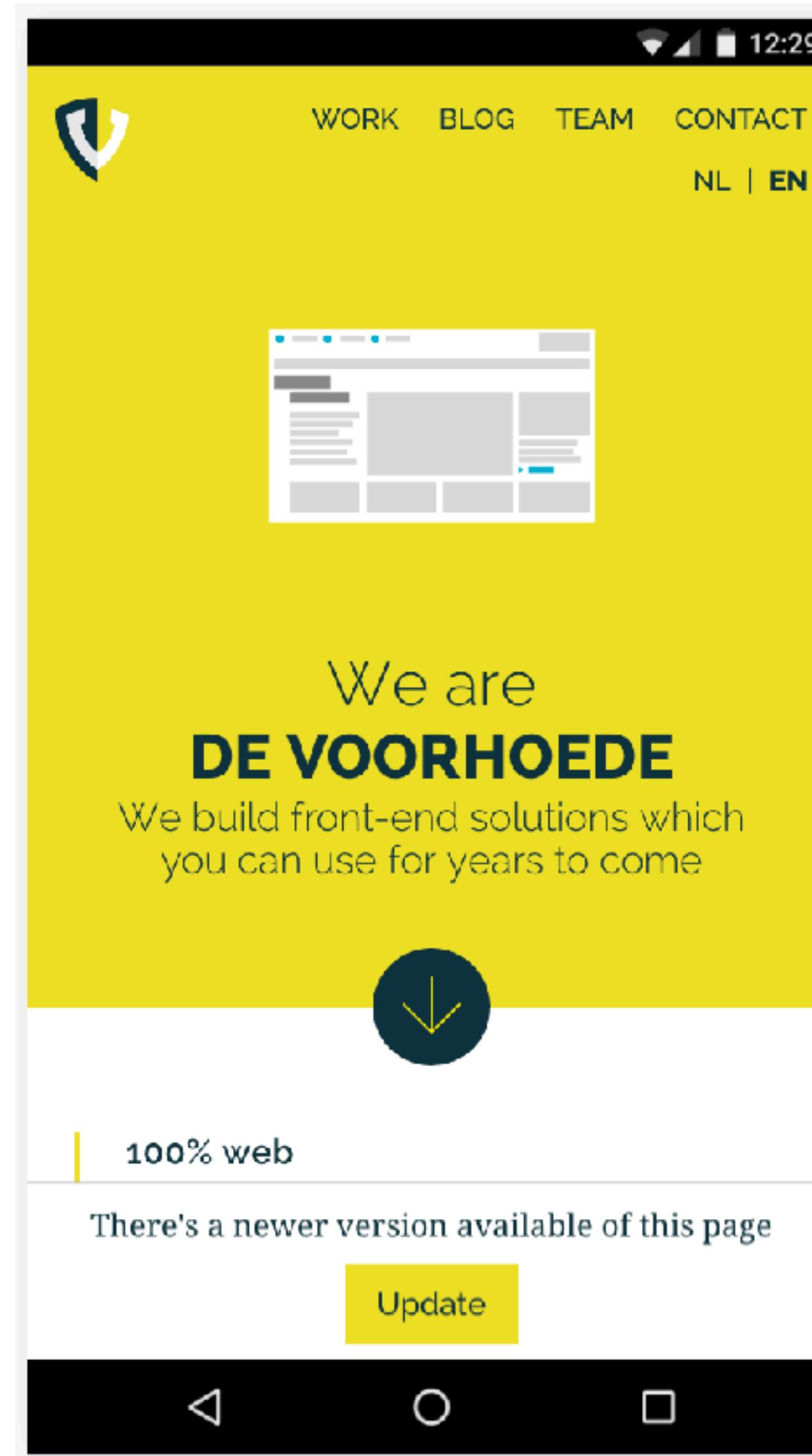
Duplication of content and routes(index.html, partial.html)

SPA, url, state, scroll position, etc

SERVICE WORKER TEMPLATING



STALE WHILE REVALIDATE



2 VERSIONS

```
...
<head>
  <title>Front-end Developers | De Voorhoede</title>
  <link rel="stylesheet" href="main-1db4c16510.css">
  <script src="index-2ab4423f75.js"></script>
</head>
```

...

```
...
<head>
  <title>Front-end Developers | De Voorhoede</title>
  <link rel="stylesheet" href="__CSS_URL__">
  <script src="__JS_URL__"></script>
</head>
```

...

ALTER THE REQUEST

```
self.addEventListener('fetch', event => {
  const request = event.request;
  if (isHtmlGetRequest(request)) {
    event.respondWith(() => {
      return fetch(request.url + 'template.html')
        .then(response => {
          // cache the template instead of full html page
        })
    })
  }
});
```

SERVICE WORKER TEMPLATING

```
template
  .replace(/__CSS_URL__/g, '/assets/css/main-1db4c16510.css')
  .replace(/__JS_URL__/g, '/assets/js/index-2ab4423f75.js');
```

SW TEMPLATING PROS

Clean updates

No SPA

SW TEMPLATING CONS

Requires js friendly templating system

Heavyweight service worker code

Routing logic in your service worker

Duplication of content and routes

PROGRESSIVE WEB APPS



PROGRESSIVE WEB APPS?

use the
latest web technologies
to create a
1st class app experience

THE PWA PRINCIPLES

Progressive

Discoverable

Linkable

Responsive

Connectivity independent

Re-engageable

Installable

Fresh

Safe

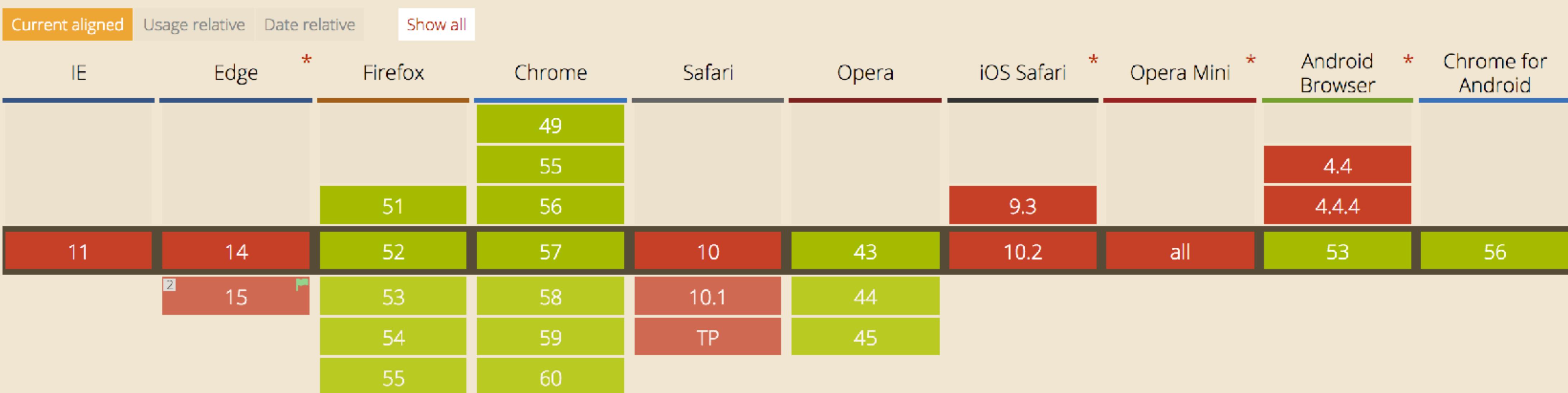
SERVICE WORKER SUPPORT

Service Workers  - WD

Global

0% + 62.8% = 62.8%

Method that enables applications to take advantage of persistent background processing, including hooks to enable bootstrapping of web applications while offline.



is SERVICEWORKER ready?

[Status](#) * [Spec](#) * [Intro](#) * [Resources](#) * [GitHub](#)

ServiceWorker enthusiasm

The first thing any implementation needs.



Chrome: Shipped.

Firefox: Shipped.

Samsung Internet: Shipped. Based on Chromium 44.2403 with some [additions and changes](#). (See "Service Worker" section.)

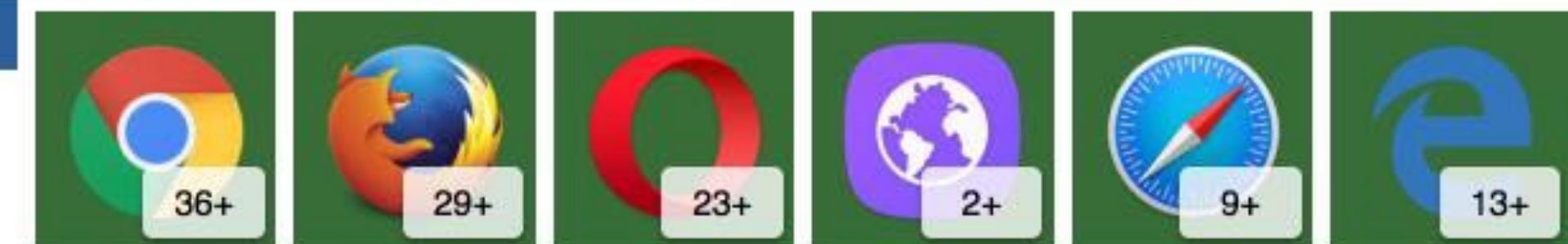
Safari: [Under consideration](#), Brief positive signals in [five year plan](#).

Edge: [In development](#).

Support does not include iOS versions of third-party browsers on that platform (see [Safari support](#)).

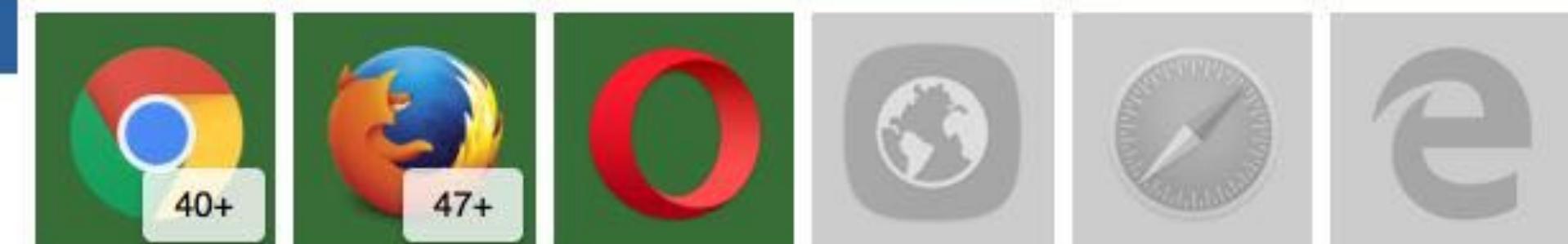
Promises

Not ServiceWorker-specific, but required by ServiceWorker. [Spec](#).



Debugging

State of debugging tools.



fetch(request)

Spec. Test.



Safari: Support landing in Safari 10.1 beta

Polyfill available

caches

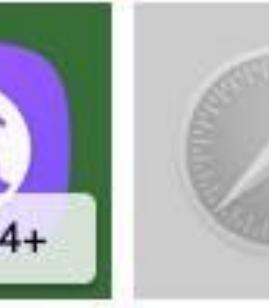
Spec. Test.



Edge: In development.

serviceWorker.ready

Spec. Test.



Background sync

Deferring tasks until the user has connectivity. Spec. Test.



Firefox: Bug 1217544

Edge: In development

ServiceWorker is coming. Look busy.

CHROME, ANDROID

Native Behaviors	Seamless Experience	Camera & Microphone	Location & Position
<ul style="list-style-type: none">LOCAL NOTIFICATIONS ✓PUSH MESSAGES ✓FOREGROUND DETECTION ✓PERMISSIONS ✓	<ul style="list-style-type: none">OFFLINE MODE ✓HOME SCREEN INSTALLATIONBACKGROUND SYNC ✓INTER-APP COMMUNICATION ✗	<ul style="list-style-type: none">AUDIO & VIDEO CAPTURE ✓ADVANCED CAMERA CONTROLS ✗RECORDING MEDIA ✓REAL-TIME COMMUNICATION ✓	<ul style="list-style-type: none">GEOLOCATION ✓GEOFENCING ✗DEVICE ORIENTATION ✓DEVICE MOTIONS ✓

Input	Surroundings	Device Features	Screen & Output
<ul style="list-style-type: none">TOUCH GESTURES ✓SPEECHrecognition ✓CLIPBOARD (COPY & PASTE) ✓POINTING DEVICE ADAPTATION ✓	<ul style="list-style-type: none">BLUETOOTH ✓NFC ✗PROXIMITY SENSORS ✗AMBIENT LIGHT ✗	<ul style="list-style-type: none">NETWORK TYPE & SPEED ✗ONLINE STATE ✓VIBRATION ✓BATTERY STATUS ✓	<ul style="list-style-type: none">FULLSCREEN ✓SCREEN ORIENTATION & LOCK ✓WAKE LOCK ✗PRESENTATION FEATURES ✓



What Web Can Do Today

Can I rely on the Web Platform features to build my app?
An overview of the device integration HTML5 APIs

✓ Feature available in your current browser

✗ Feature not available in your current browser

Operating System

- OFFLINE STORAGE ✓
- FILE ACCESS ✓
- CONTACTS ✗
- STORAGE QUOTAS ✓

SAFARI, IOS

Native Behaviors	Seamless Experience	Camera & Microphone	Location & Position
LOCAL NOTIFICATIONS ✓ » PUSH MESSAGES ✓ » FOREGROUND DETECTION ✓ » PERMISSIONS ✗ »	OFFLINE MODE ✗ » HOME SCREEN INSTALLATION » BACKGROUND SYNC ✗ » INTER-APP COMMUNICATION ✗ »	AUDIO & VIDEO CAPTURE ✗ » ADVANCED CAMERA CONTROLS ✗ » RECORDING MEDIA ✗ » REAL-TIME COMMUNICATION ✗ »	GEOLOCATION ✓ » GEOFENCING ✗ » DEVICE ORIENTATION ✓ » ACCELEROMETER ✓ »

Input	Surroundings	Device Features	Screen & Output
TOUCH GESTURES ✗ » SPEECH RECOGNITION ✗ » CLIPBOARD (COPY & PASTE) ✓ » POINTING DEVICE ADAPTATION ✗ »	BLUETOOTH ✗ » NFC ✗ » PROXIMITY SENSORS ✗ » AMBIENT LIGHT ✗ »	NETWORK TYPE & SPEED ✗ » ONLINE STATE ✓ » VIBRATION ✗ » BATTERY STATUS ✗ »	FULLSCREEN ✓ » SCREEN ORIENTATION & LOCK ✗ » WAKE LOCK ✗ » PRESENTATION FEATURES ✗ »



What Web Can Do Today

Can I rely on the Web Platform features to build my app?
An overview of the device integration HTML5 APIs

✓ Feature available in your current browser

✗ Feature not available in your current browser

Operating System

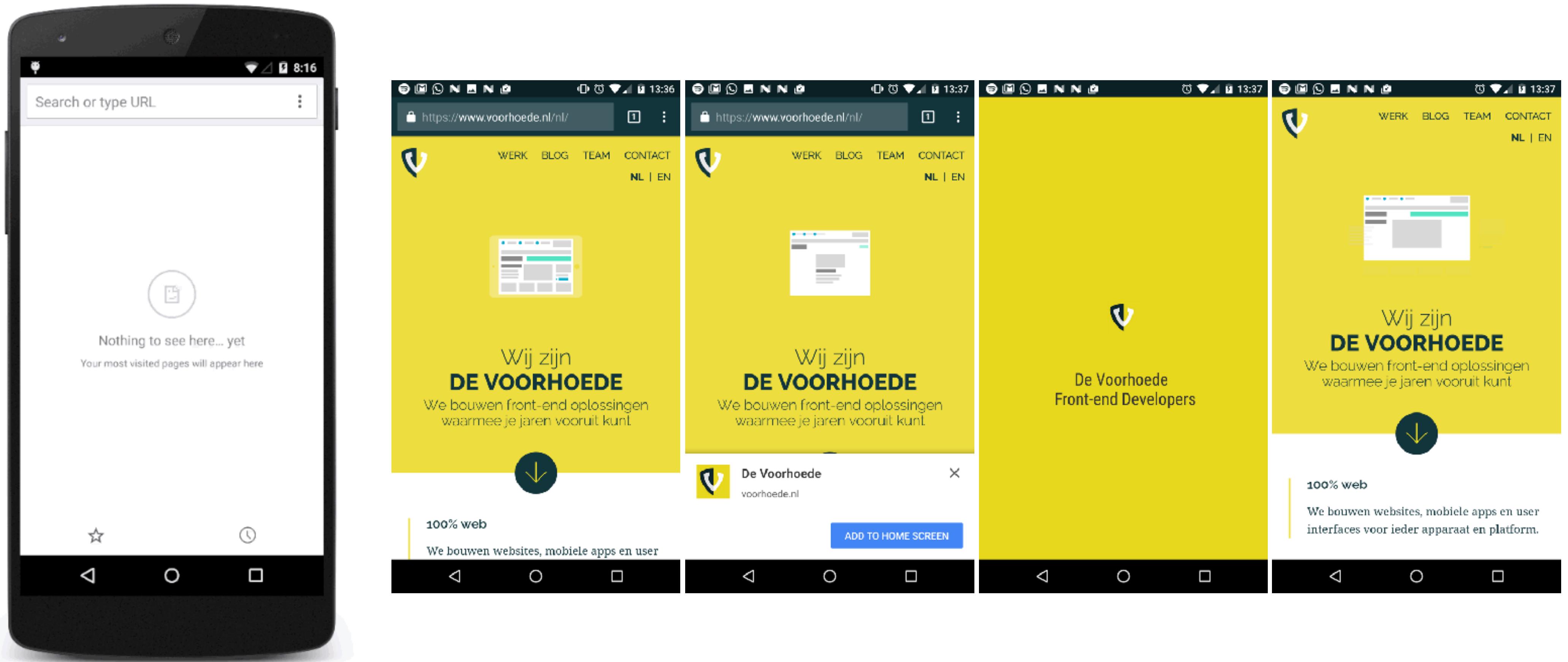
OFFLINE STORAGE ✓ »

FILE ACCESS ✓ »

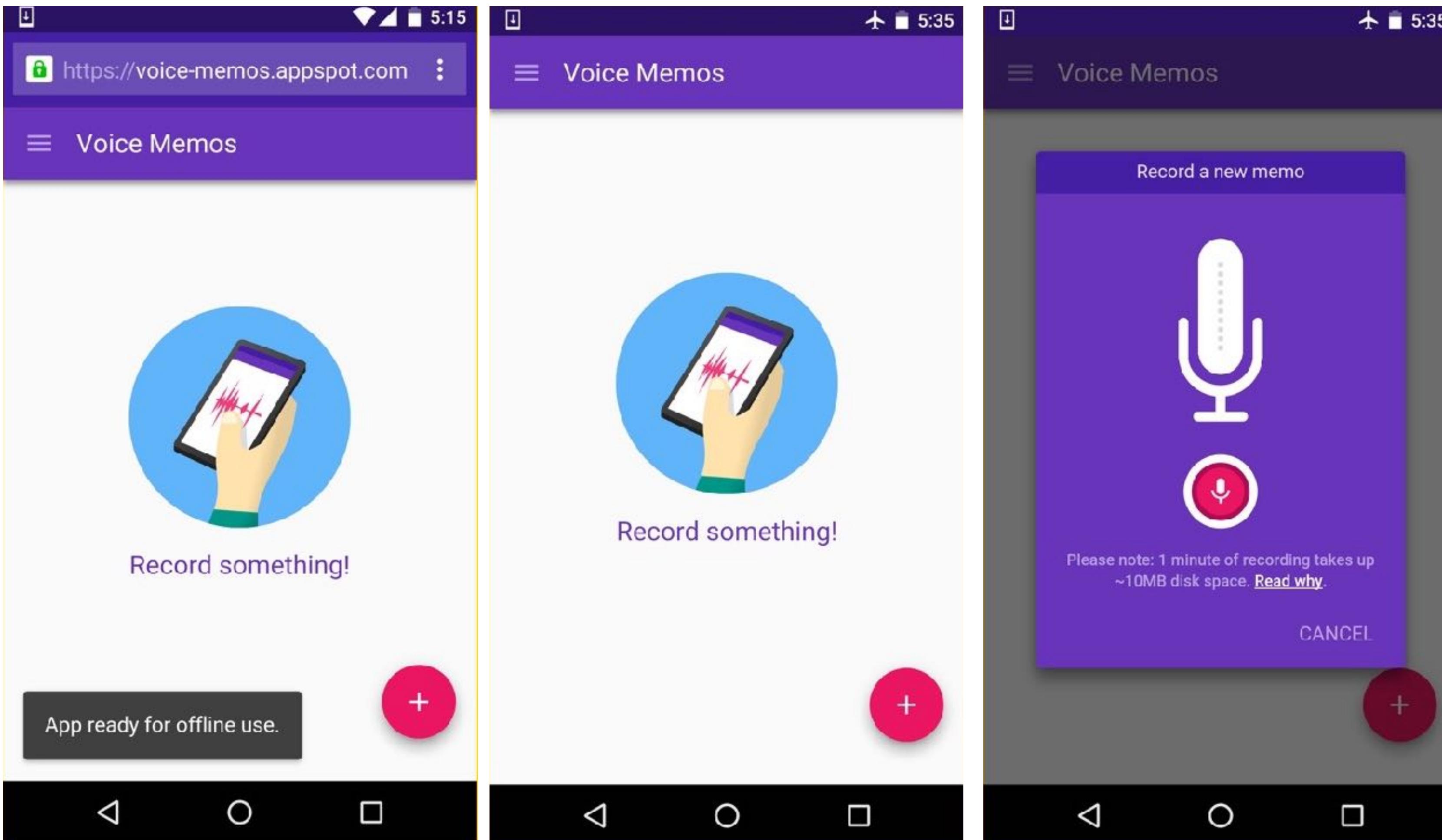
CONTACTS ✗ »

STORAGE QUOTAS ✗ »

STARTS AS WEBSITE

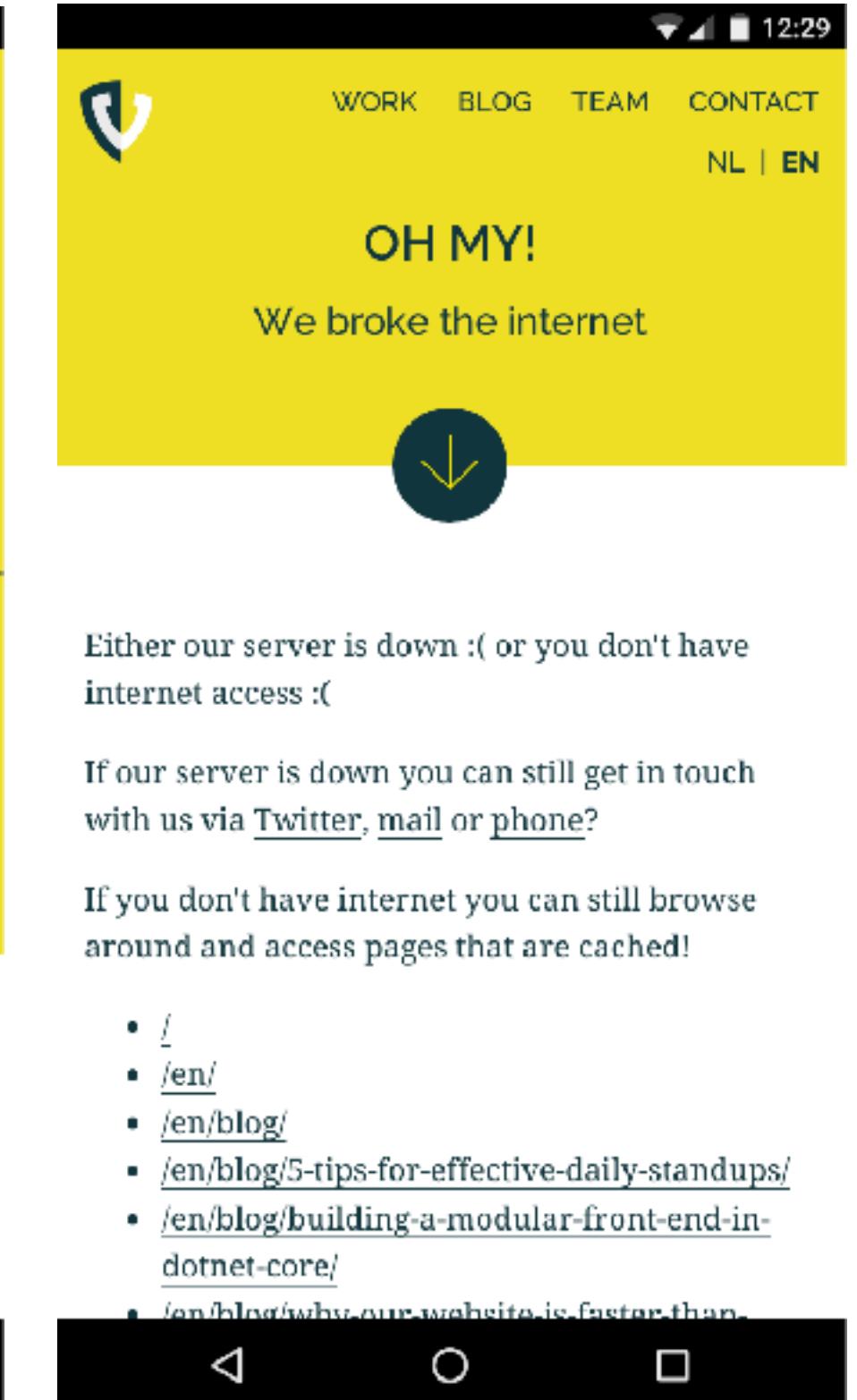
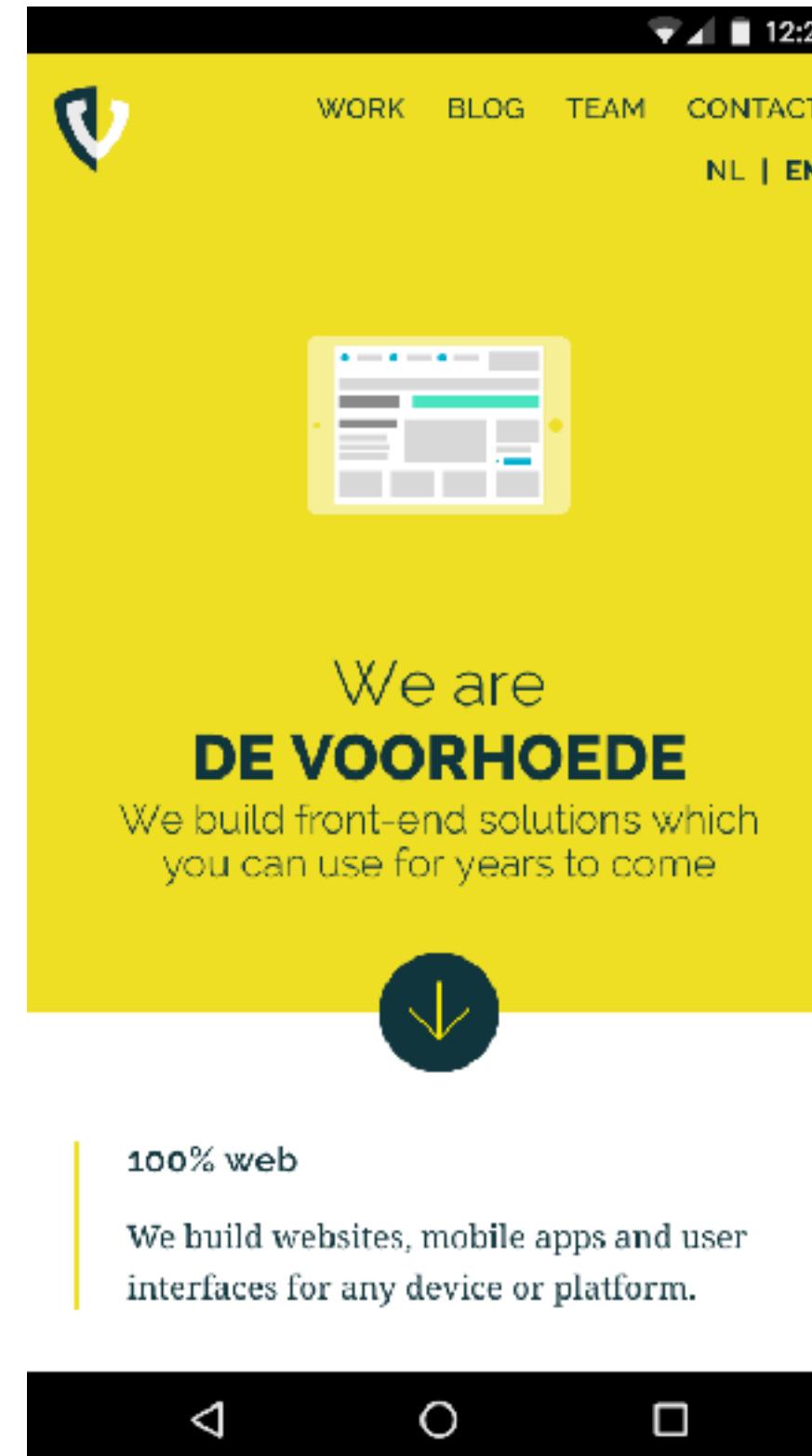
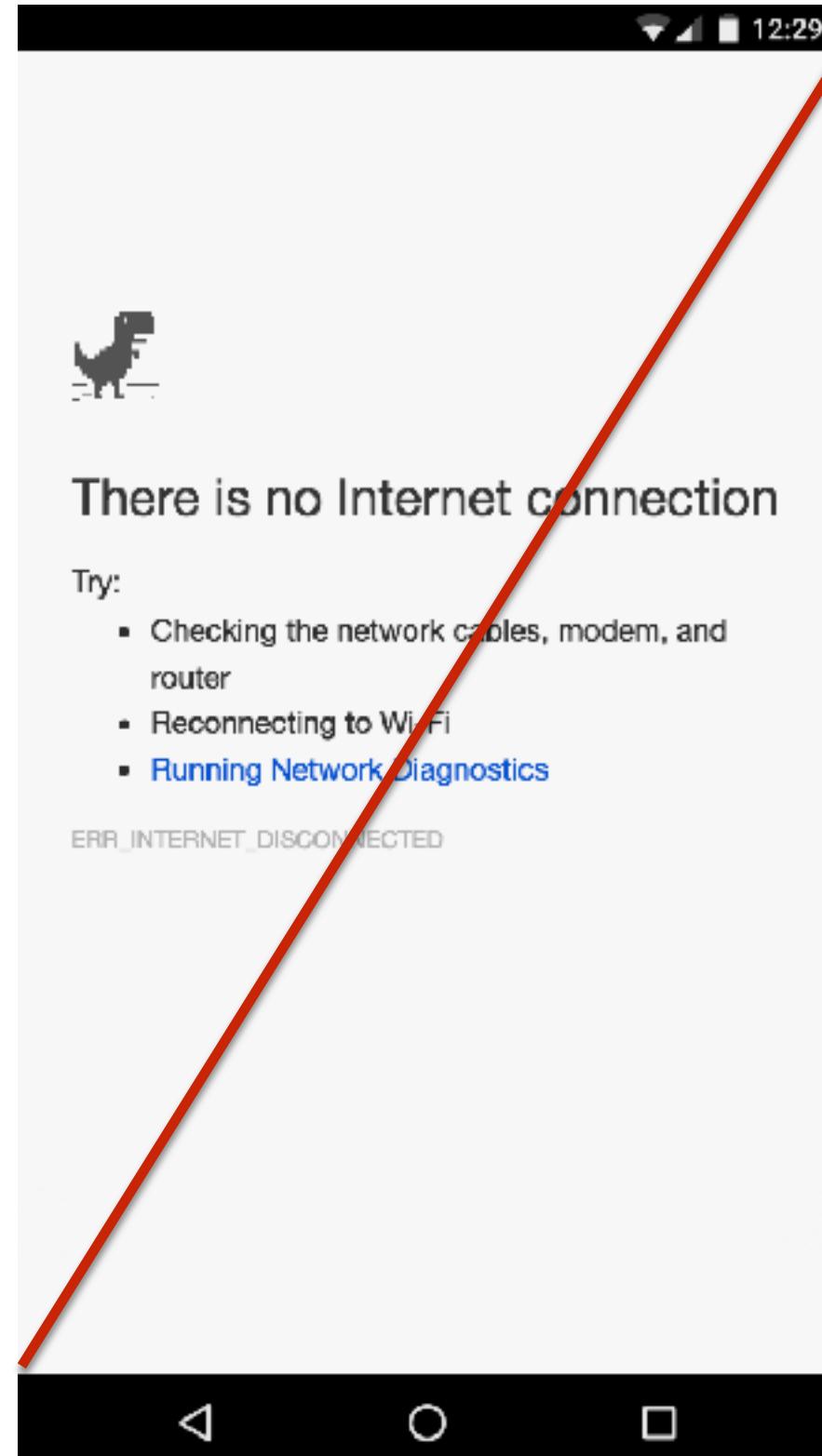


OFFLINE SUPPORT

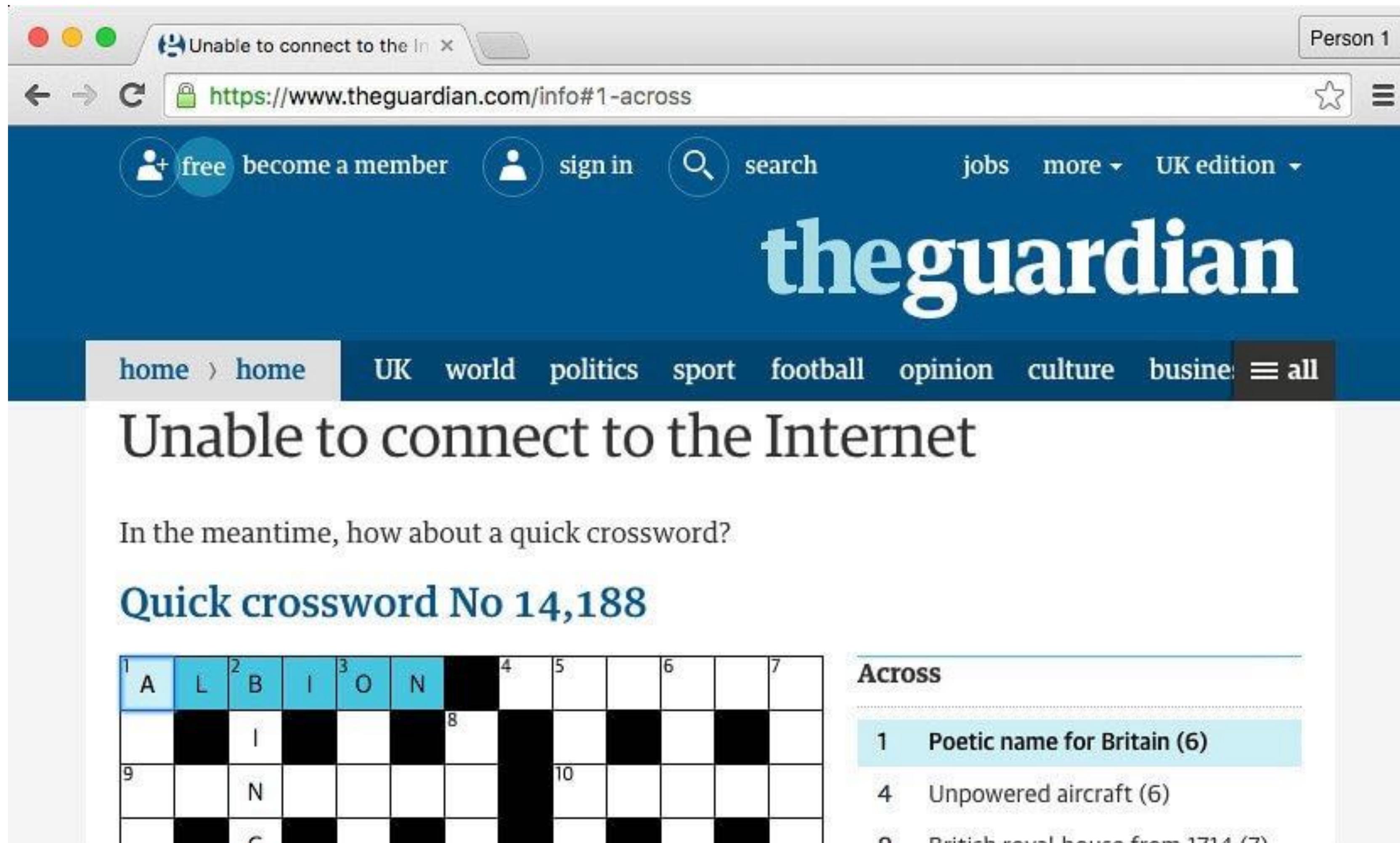


developers.google.com/web

OFFLINE SUPPORT

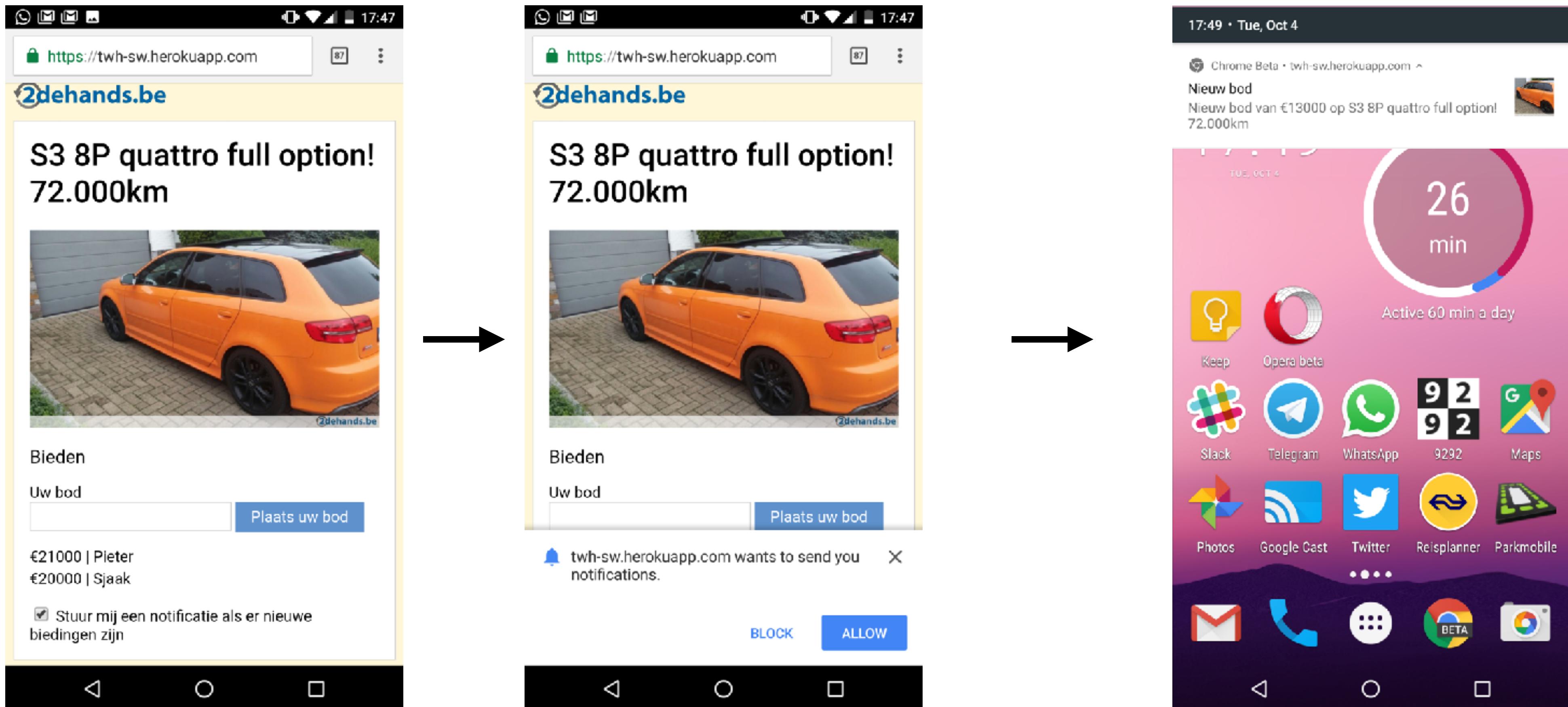


OFFLINE SUPPORT



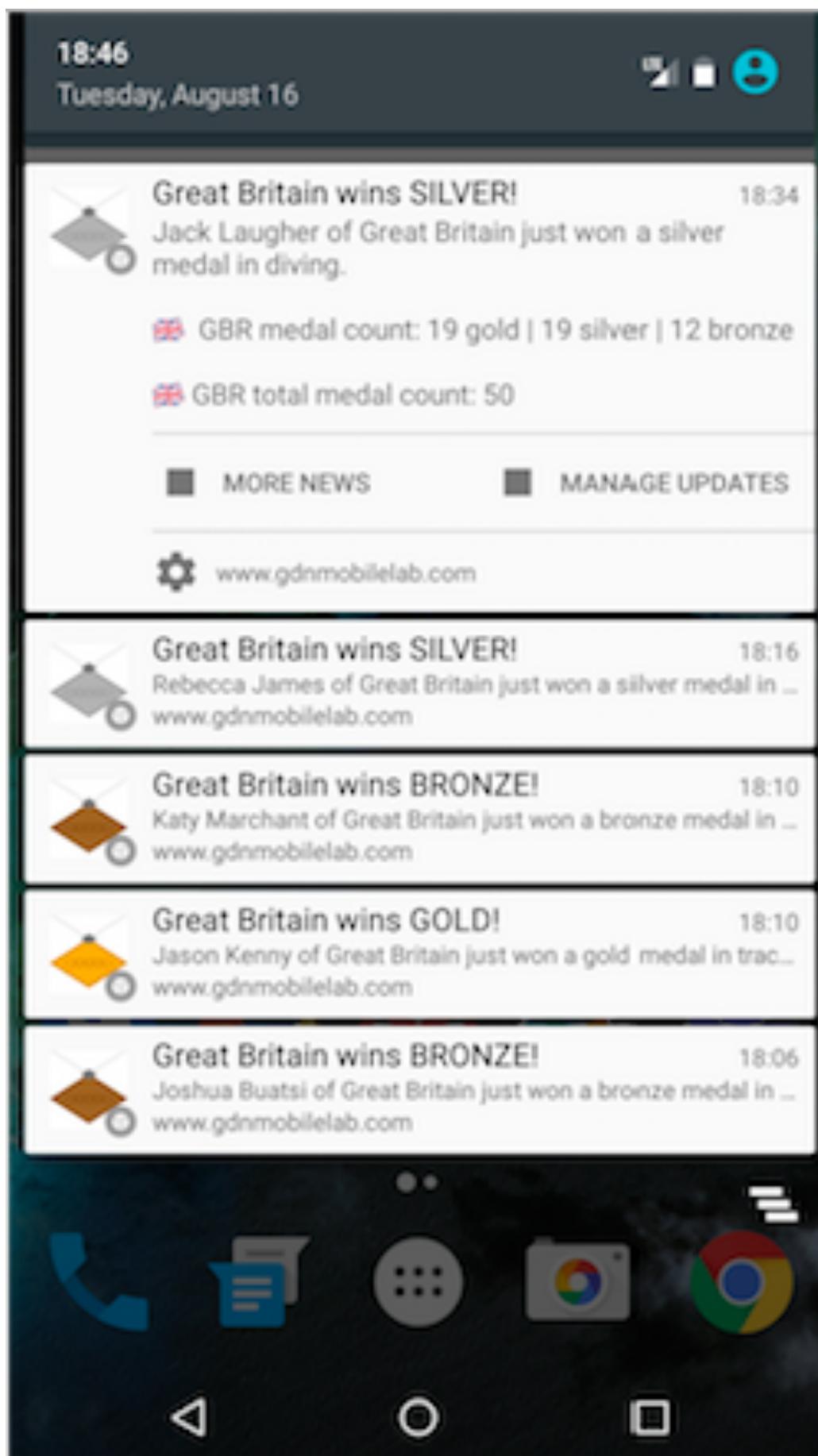
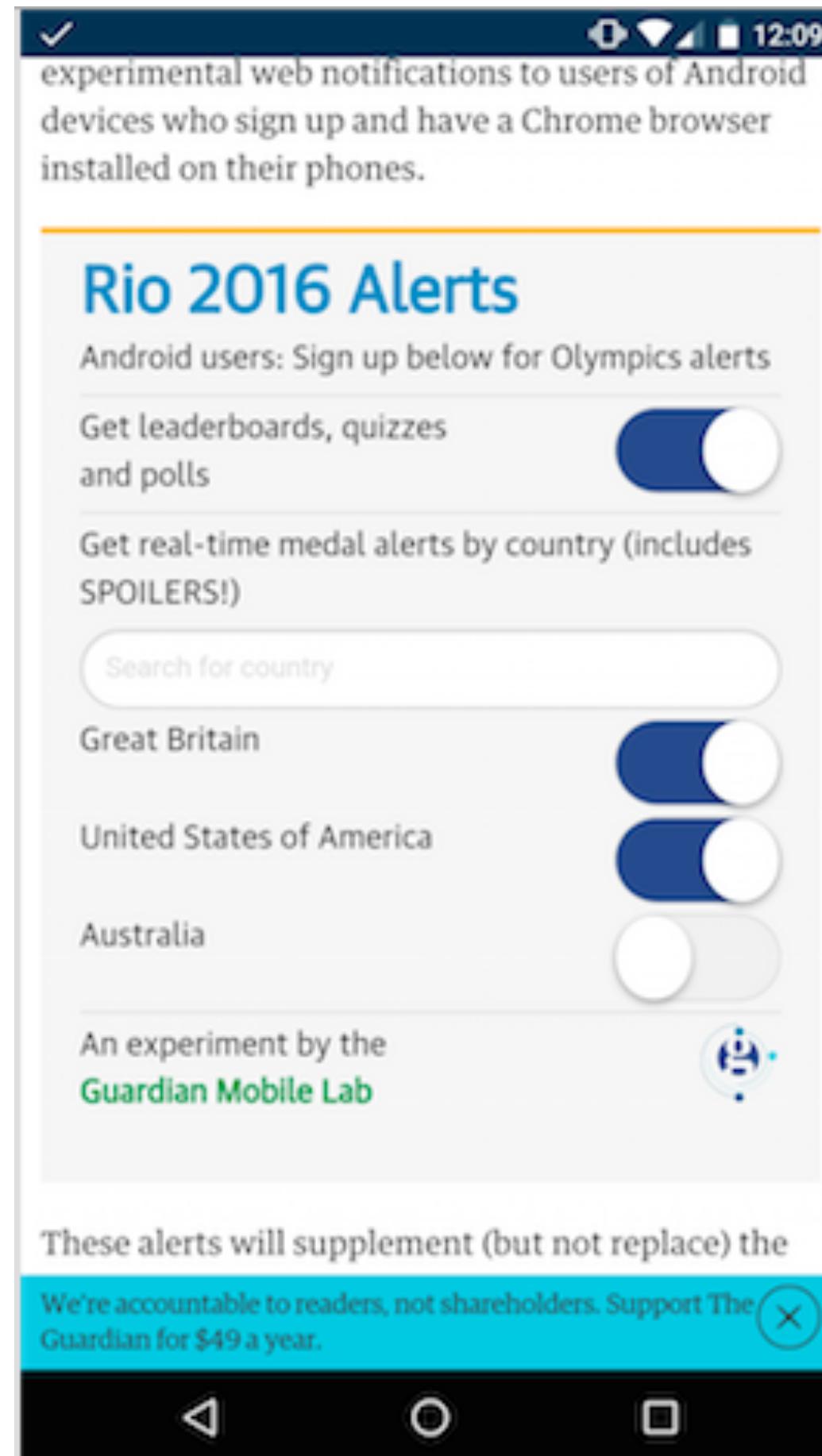
smashingmagazine.com/2016/08/a-beginners-guide-to-progressive-web-apps/

PUSH NOTIFICATIONS 2DEHANDS POC



twh-sw.herokuapp.com

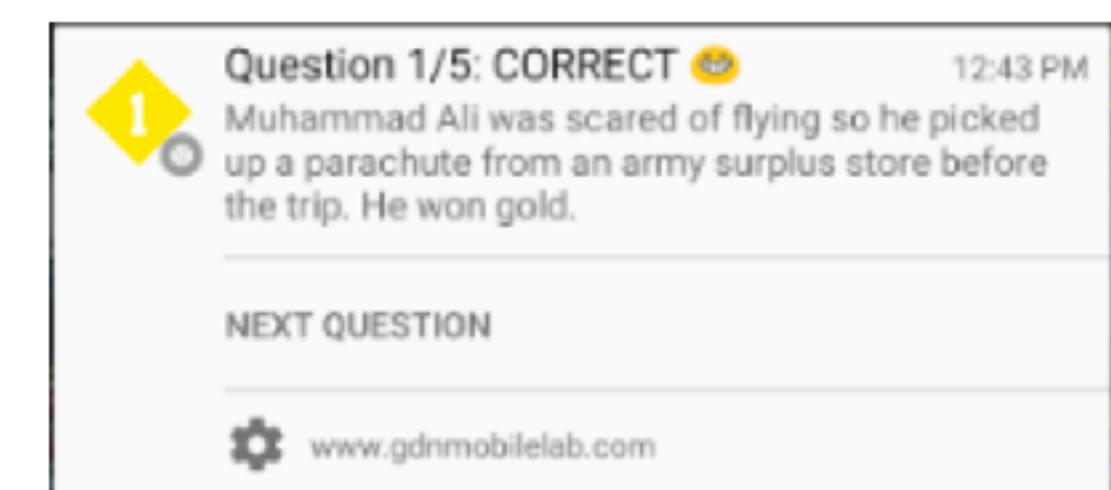
PUSH NOTIFICATIONS



Users tapped the action button to start the quiz



Users tapped on the action button with their answer



The answer was revealed before going to the next question

BACKGROUND SYNC

You are currently offline. Any requests made will be queued and synced as soon as you go online again.

Click on the button below to make an HTTP request.

HTTP Request is queued

Make an HTTP request - do it!

Name	Path	Status	Text	Domain	Type	Initi...	Size	Time	Latency	Timeli...
	doge.png /Service-Workers...	304	Not Mod...	deanhume.github...	p...	Oth...	334 B 342 KB	250 ms 234 ms		

You are currently online!

Click on the button below to make an HTTP request.

HTTP Request is made

Make an HTTP request - do it!

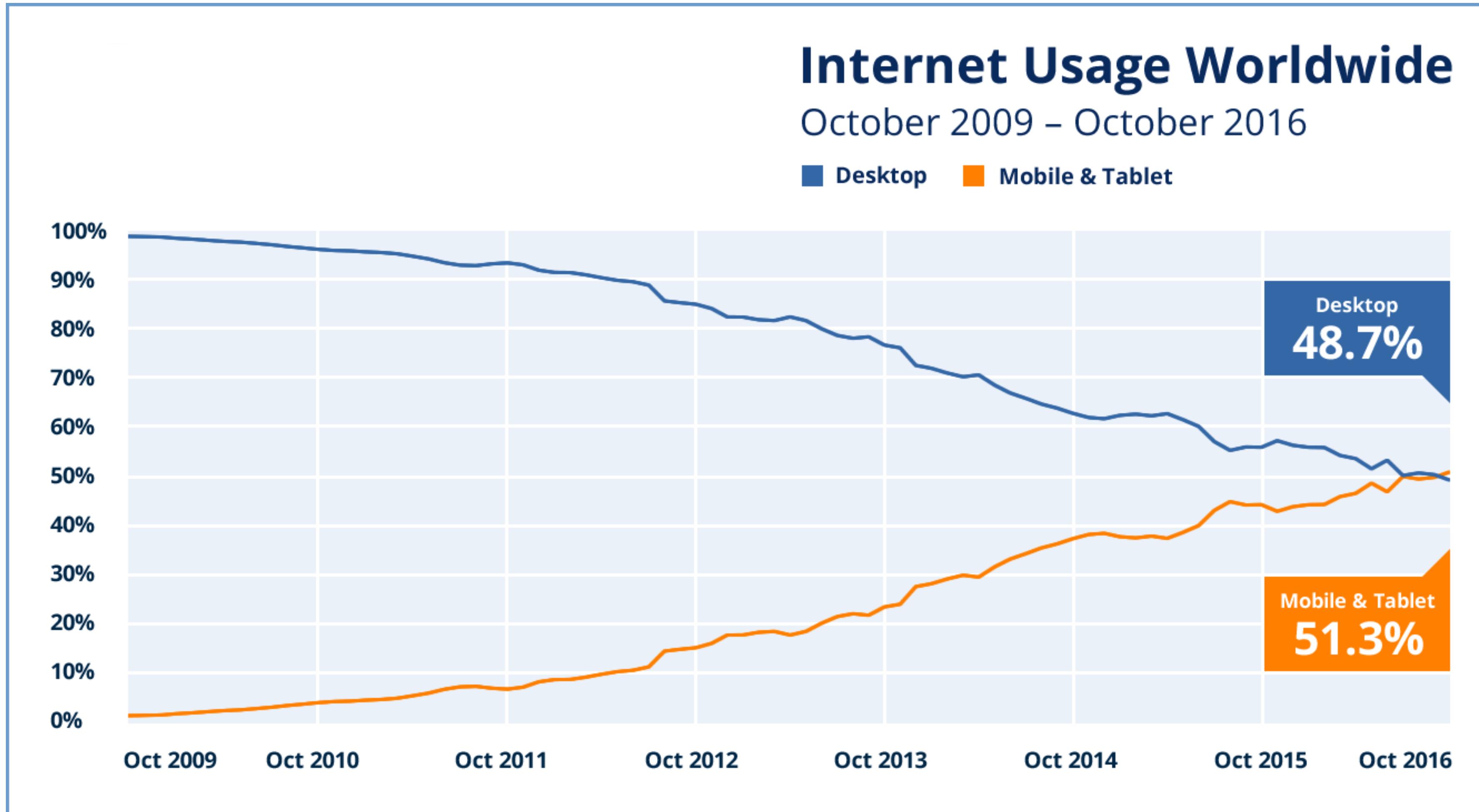
Name	Path	Status	Text	Domain	Type	Initi...	Size	Time	Latency	Timeli...
	doge.png /Service-Workers...	304	Not Mod...	deanhume.github...	p...	Oth...	334 B 342 KB	250 ms 234 ms		

CREATING A CASE



Web won on desktop

IN THE MEANTIME

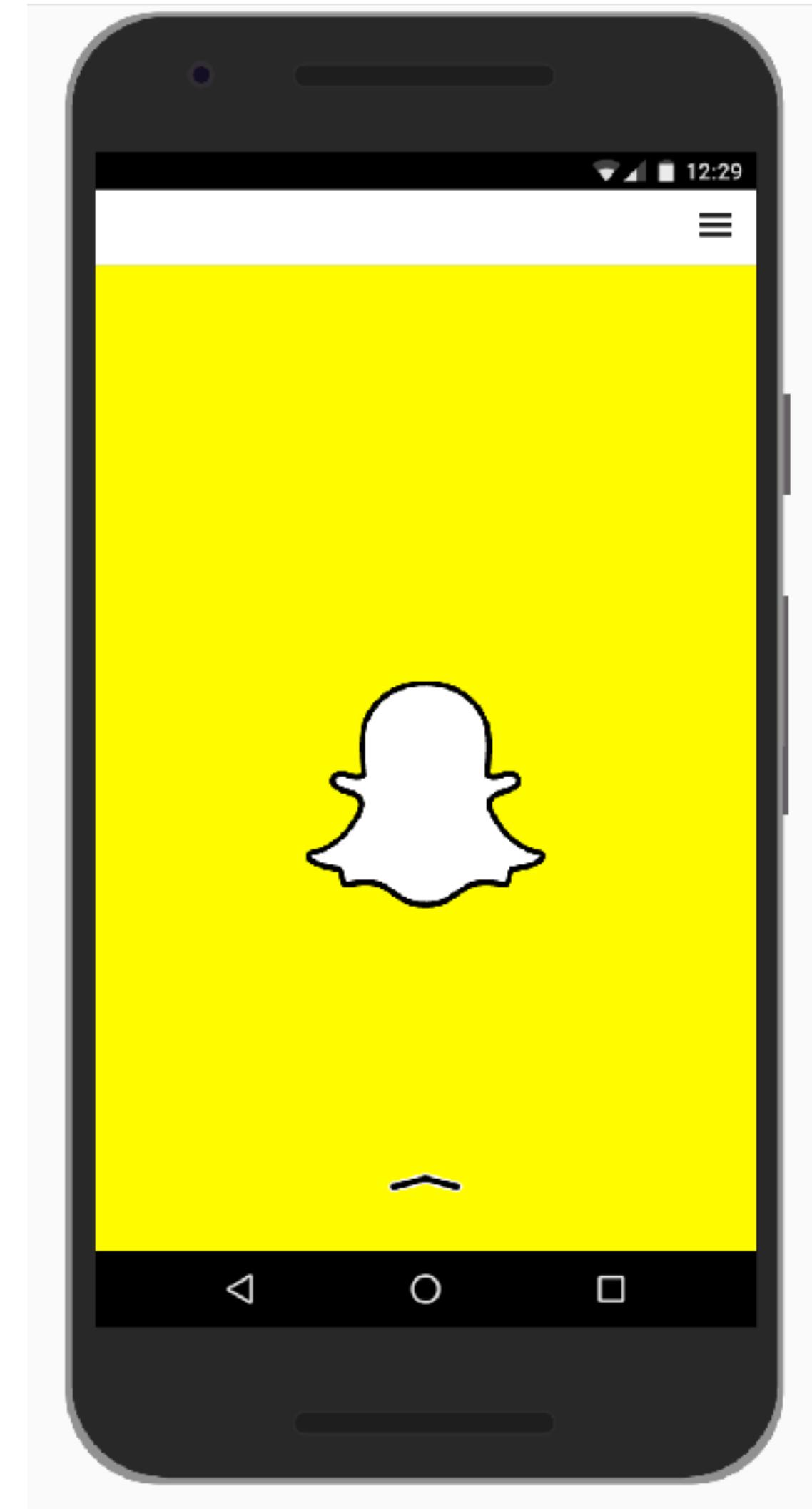


Mobile and tablet internet usage exceeds desktop for first time worldwide

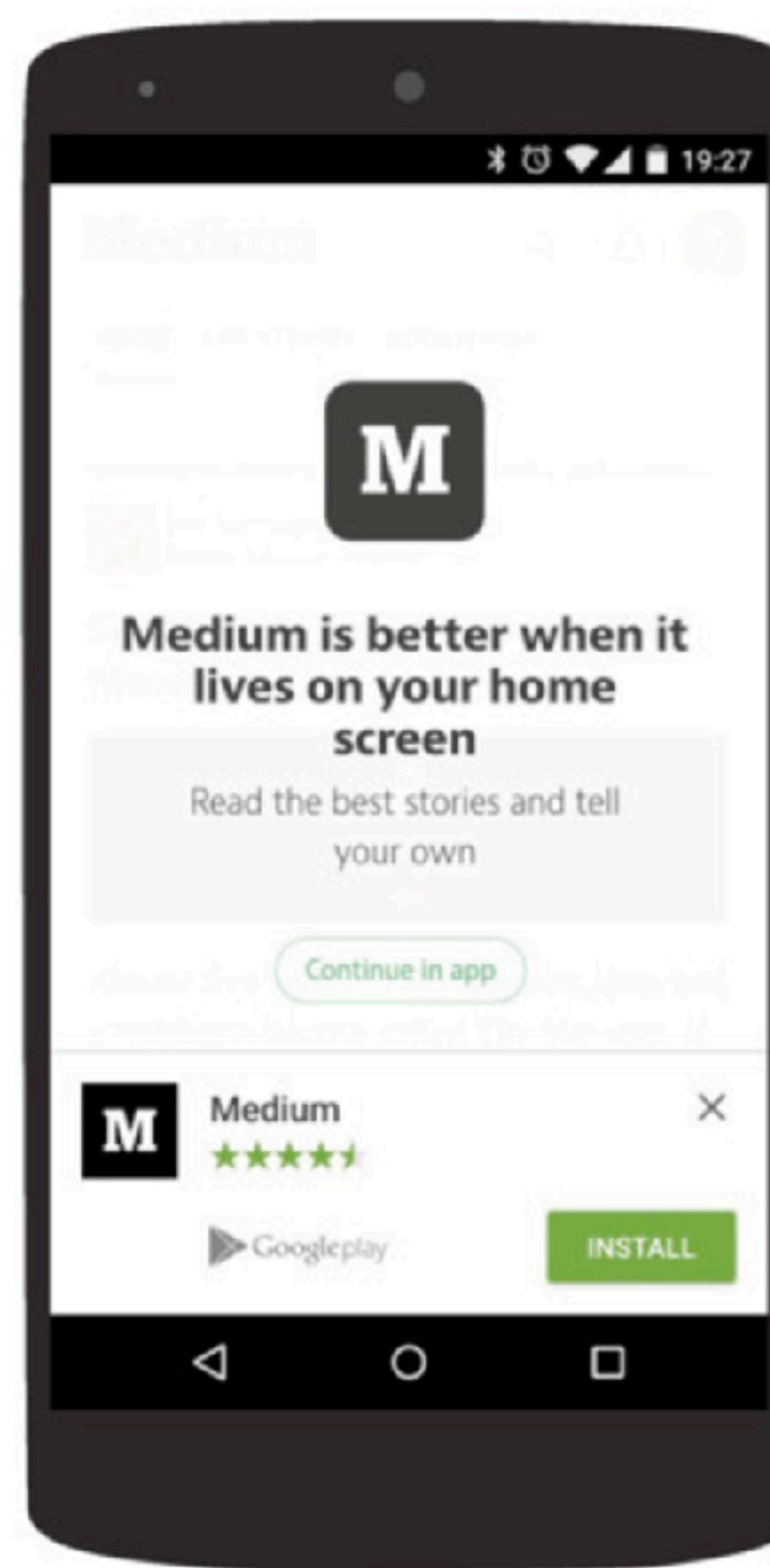
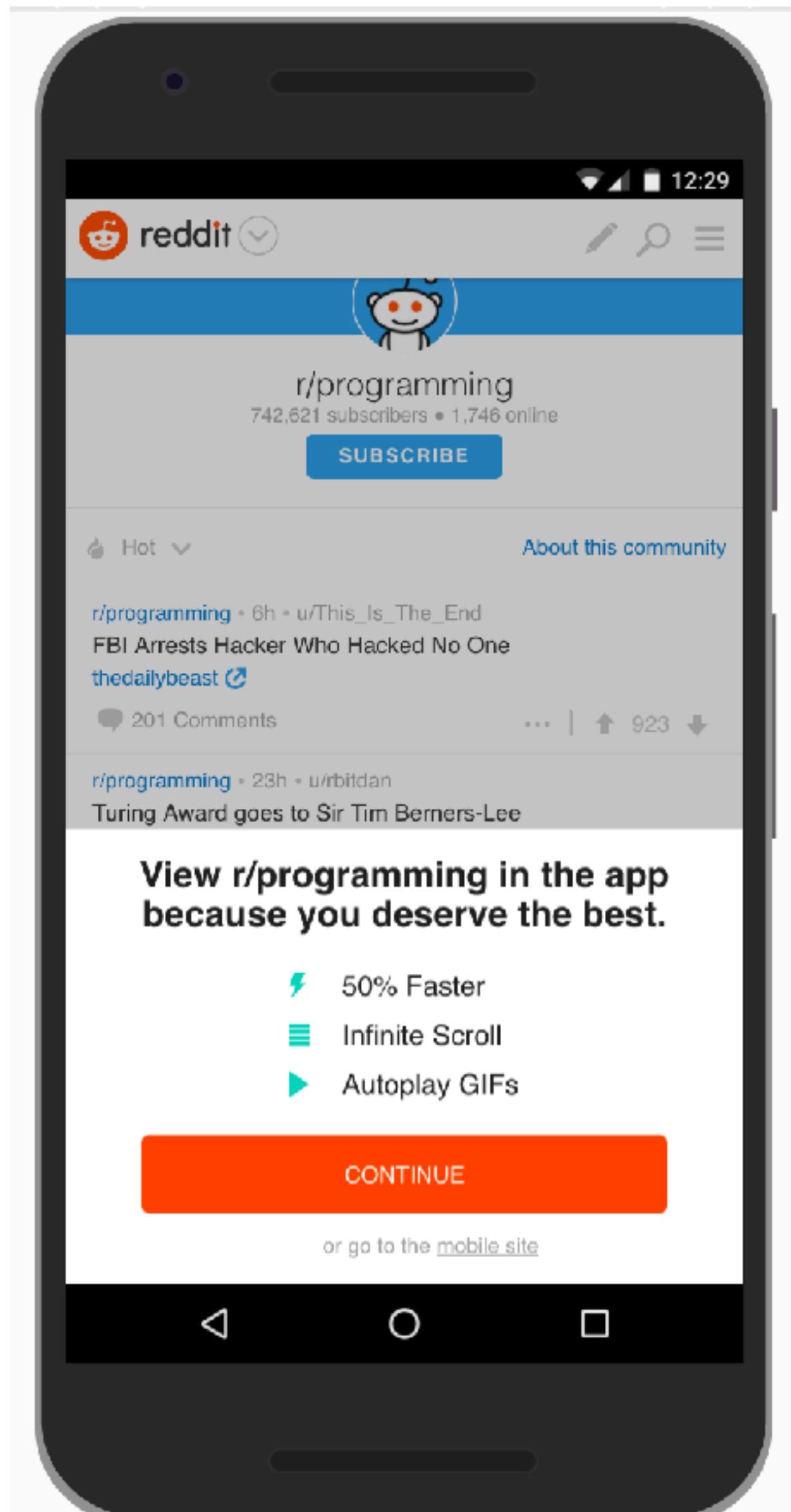
APP ONLY

Instagram can only view photos online

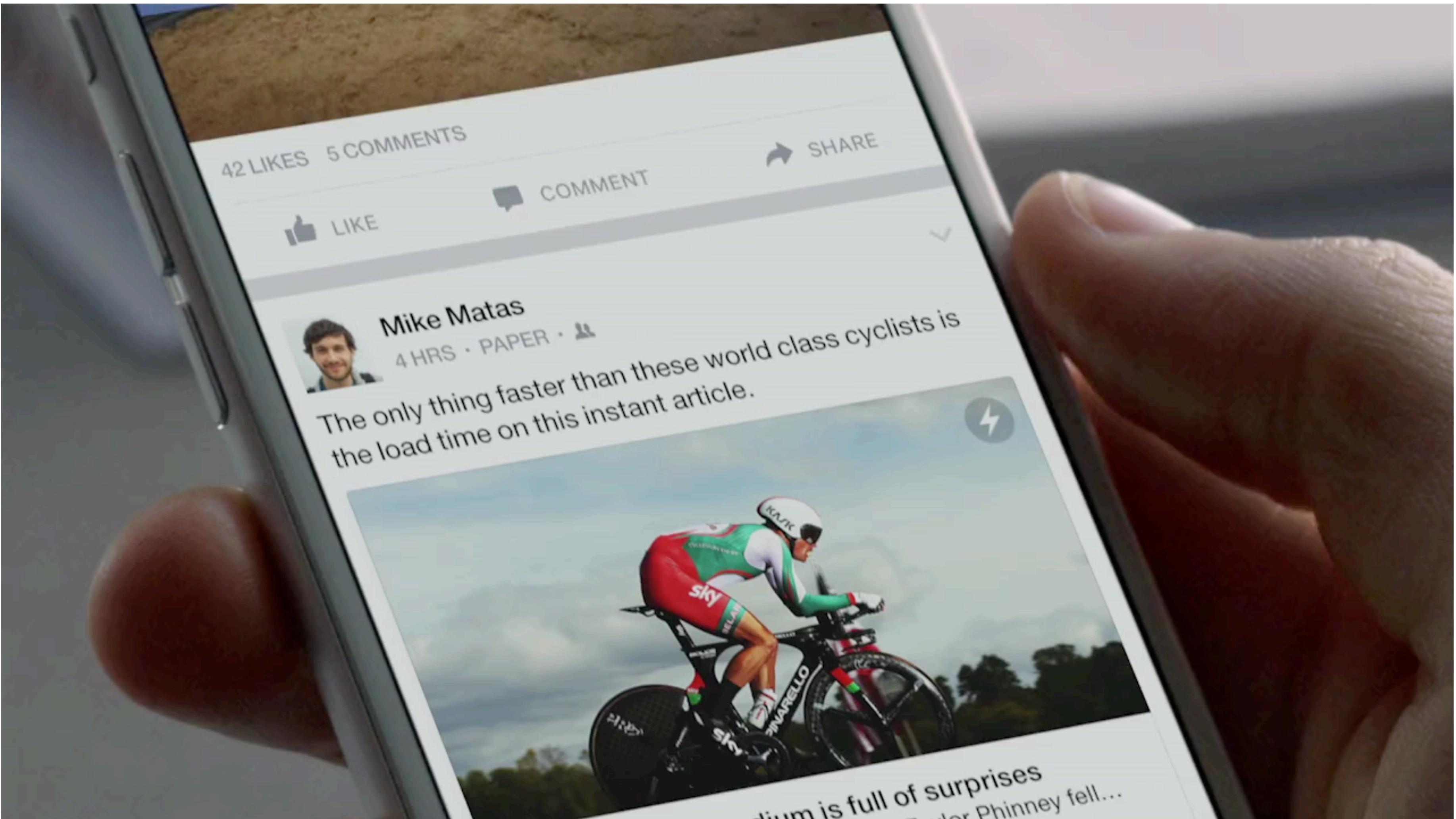
Snapchat doesn't exist on the web



DON'T USE ME



THE WEB IS SLOW



THE WEB IS SLOW



AMP

ABOUT

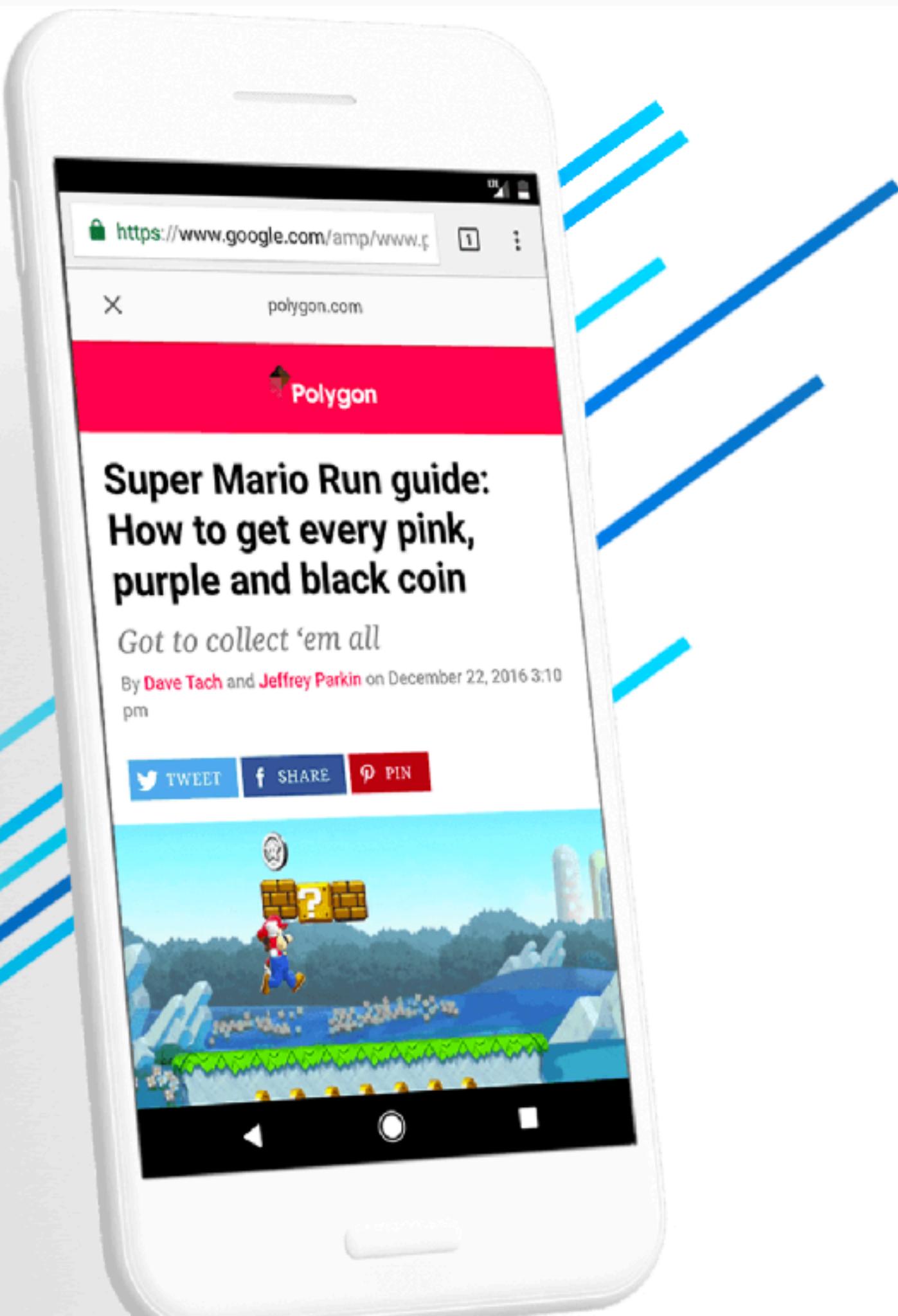
DOCS

THE LATEST

SUPPORT



ENGLISH ▾



Building the future web, together.

The AMP Project is an open-source initiative aiming to make the web better for all. The project enables the creation of websites and ads that are consistently fast, beautiful and high-performing across devices and distribution platforms.

[LEARN ABOUT AMP](#)

OR [START BUILDING](#)

THE LATEST

NEWS

AMP Roadmap update to close out Q1

MARCH 31, 2017

NEWS

Learn the AMP basics in your language!

MARCH 14, 2017

NEWS

AMP grows its footprint

MARCH 7, 2017

Apple universal links

**Take the best of the web, the
URL, and put it in your app**

RE-ENGAGEMENT ↑

Suumo delivering
faster speed and
better re-engagement

75% decrease
in loading times on landing pages

31% open rate
from Web Push Notifications



youtube.com/watch?v=0SSI8liELJU&t=32m41s

RETENTION ↑

selioapp.com

AVERAGE SESSION

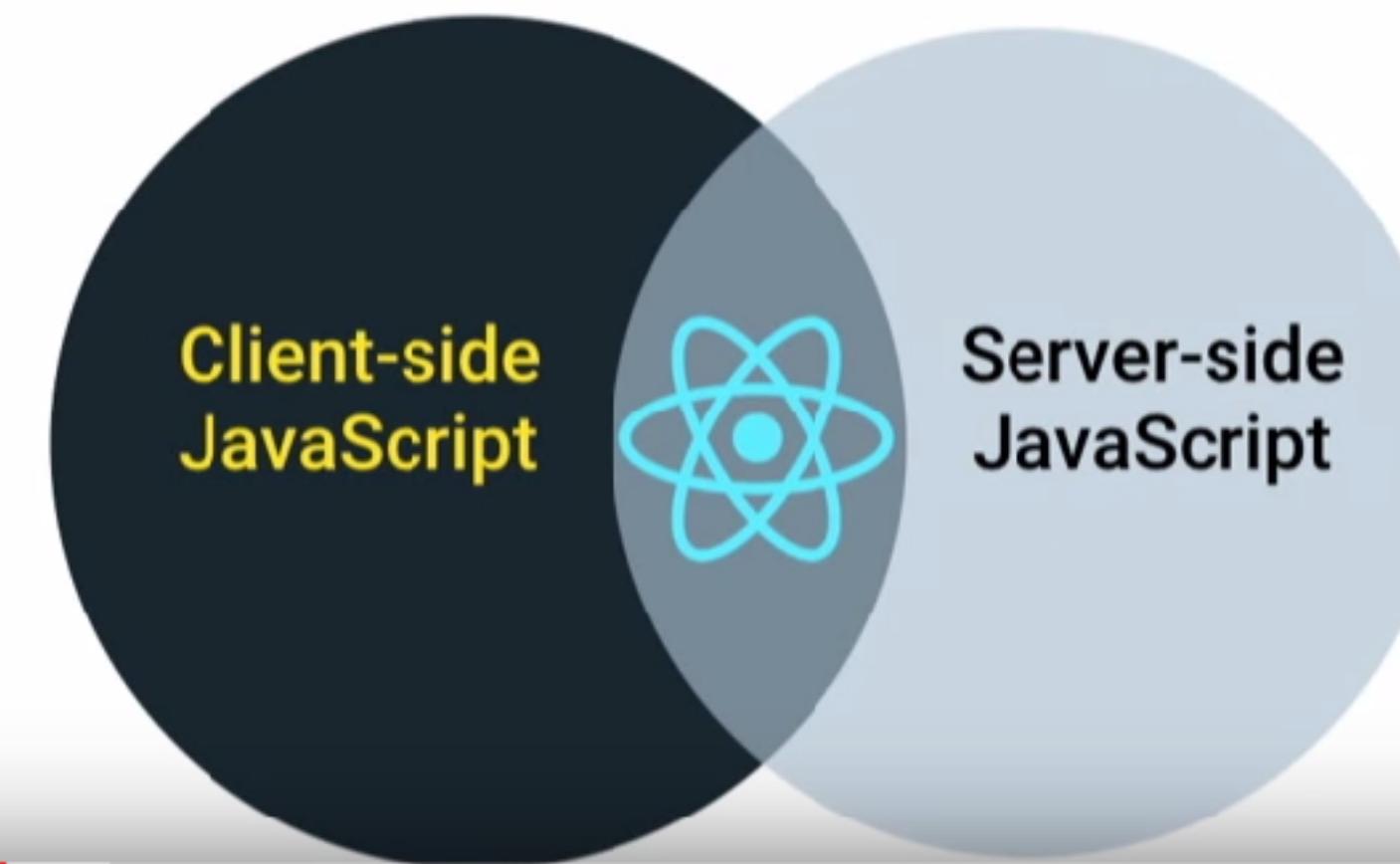
6+

minutes

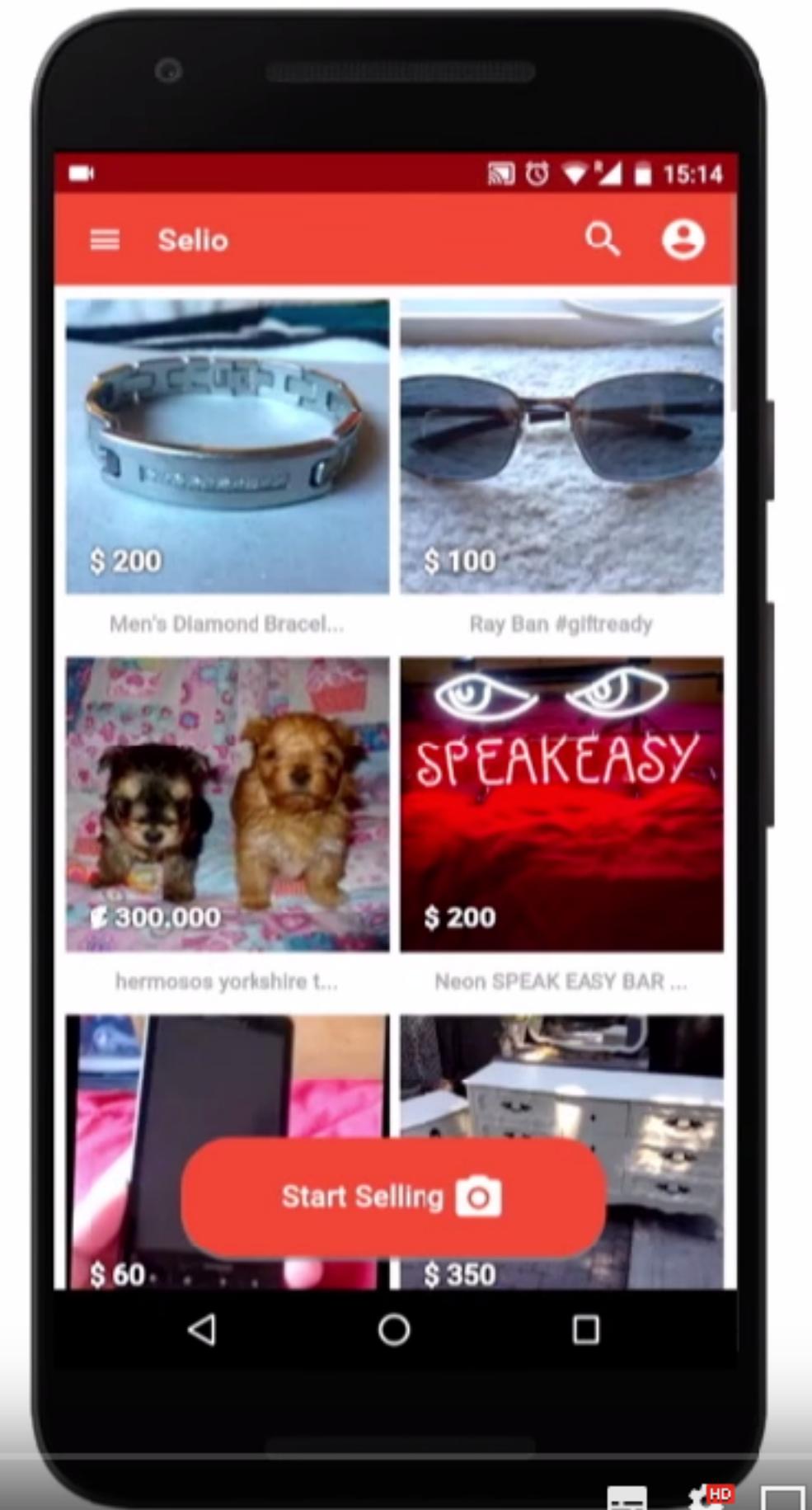
USER ACQUISITION

10X

cheaper than native



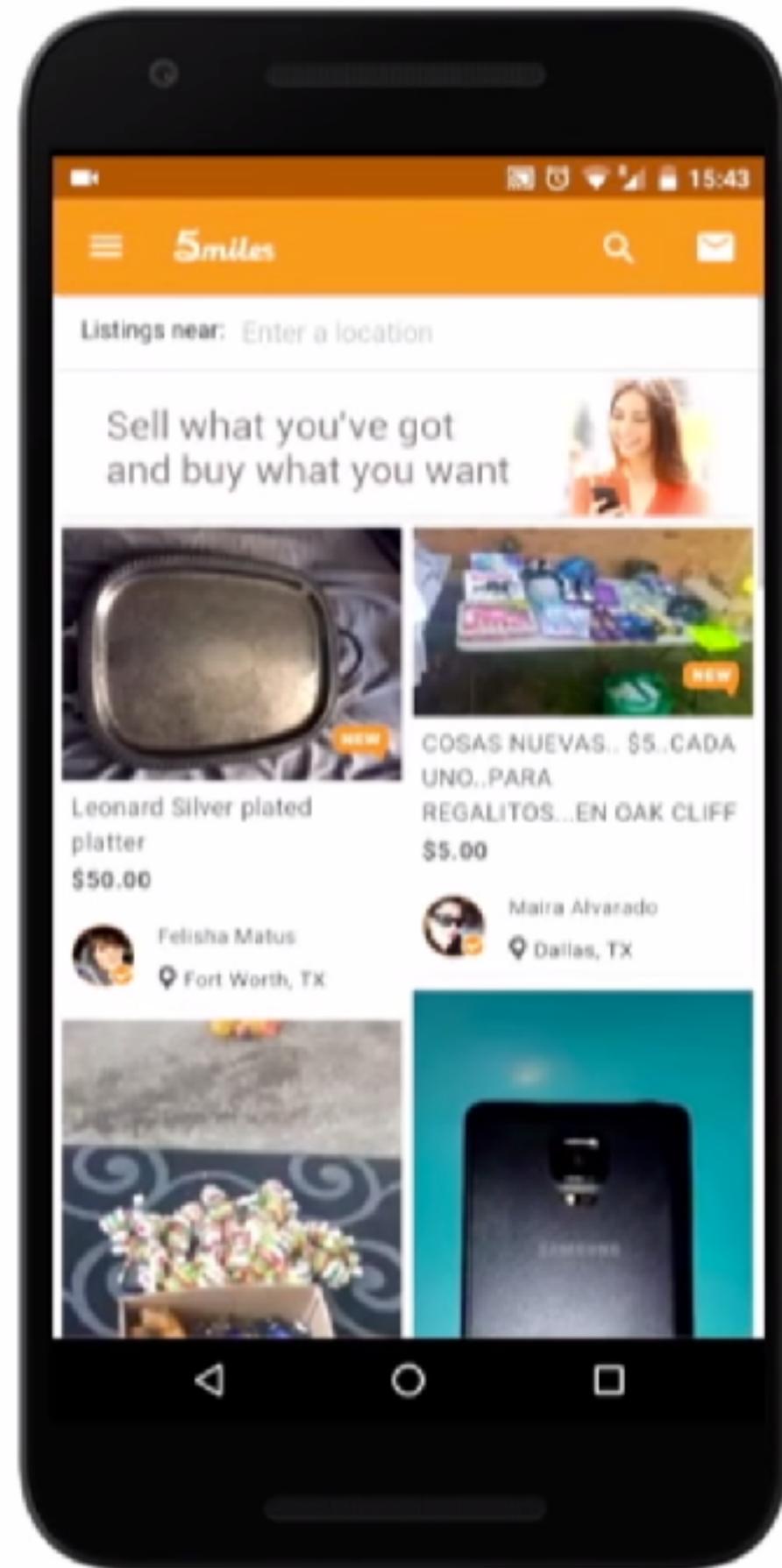
3:46 / 43:08



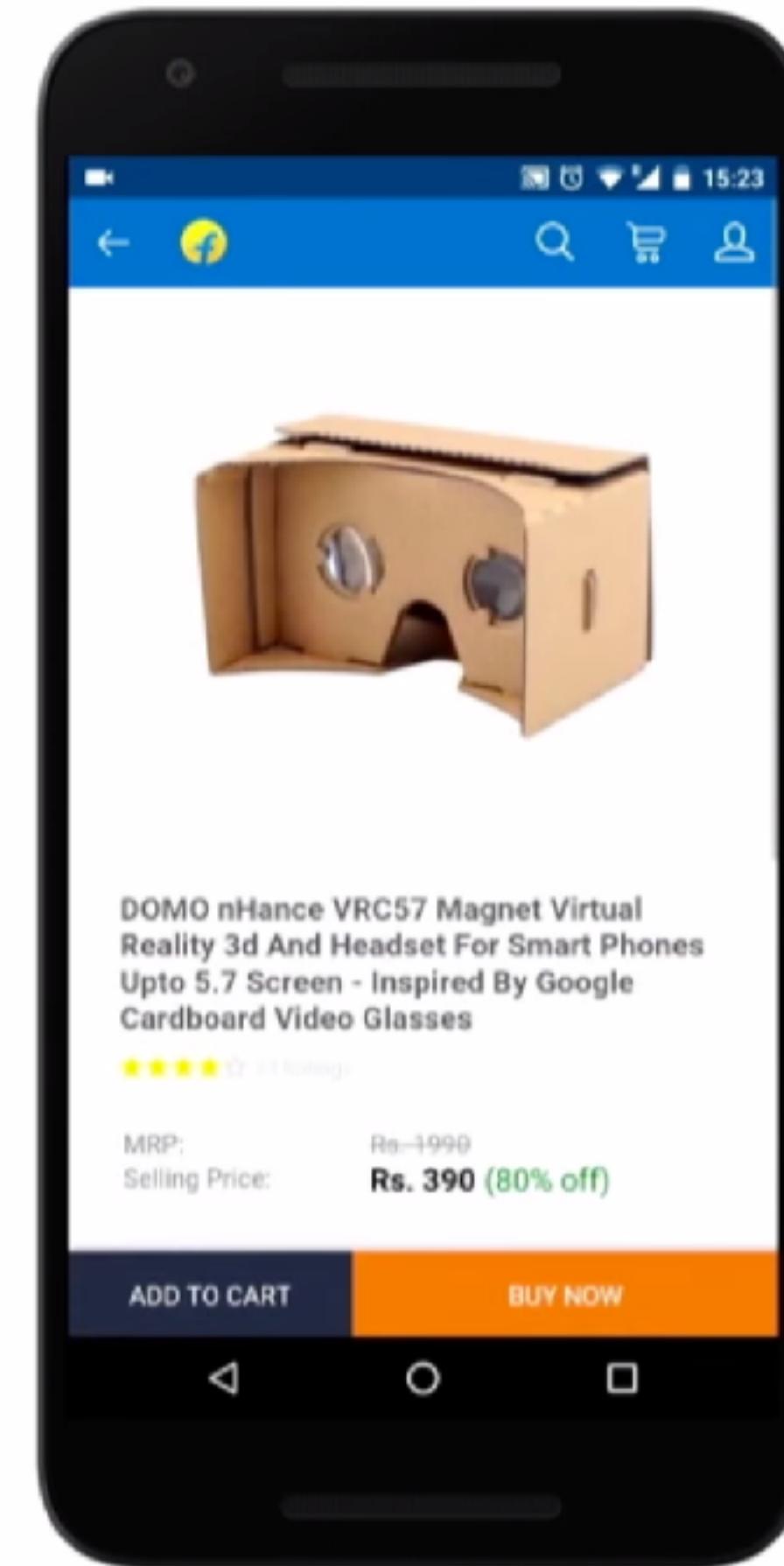
www.youtube.com/watch?v=srdKq0DckXQ&t=3m40s

CONVERSION ↑

A2HS USERS HAD
30%
BETTER CONVERSIONS

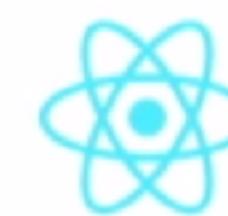


5miles



FlipKart

A2HS USERS HAD
70%
BETTER CONVERSIONS



React



youtube.com/watch?v=srdKq0DckXQ&t=3m

WHAT ABOUT IOS?



Jason Grigsby, 4 @grigs

22 Sep

@josephjames while I have your attention, have you seen an increase in engagement on iOS side or just browsers that support PWAs fully?



Joey Marburger

@josephjames

 Follow

@grigs All PWA has higher engagement. Minimal differences between iOS and Android.

11:24 PM - 22 Sep 2016



1

[Why does The Washington Post's Progressive Web App increase engagement on iOS?](#)

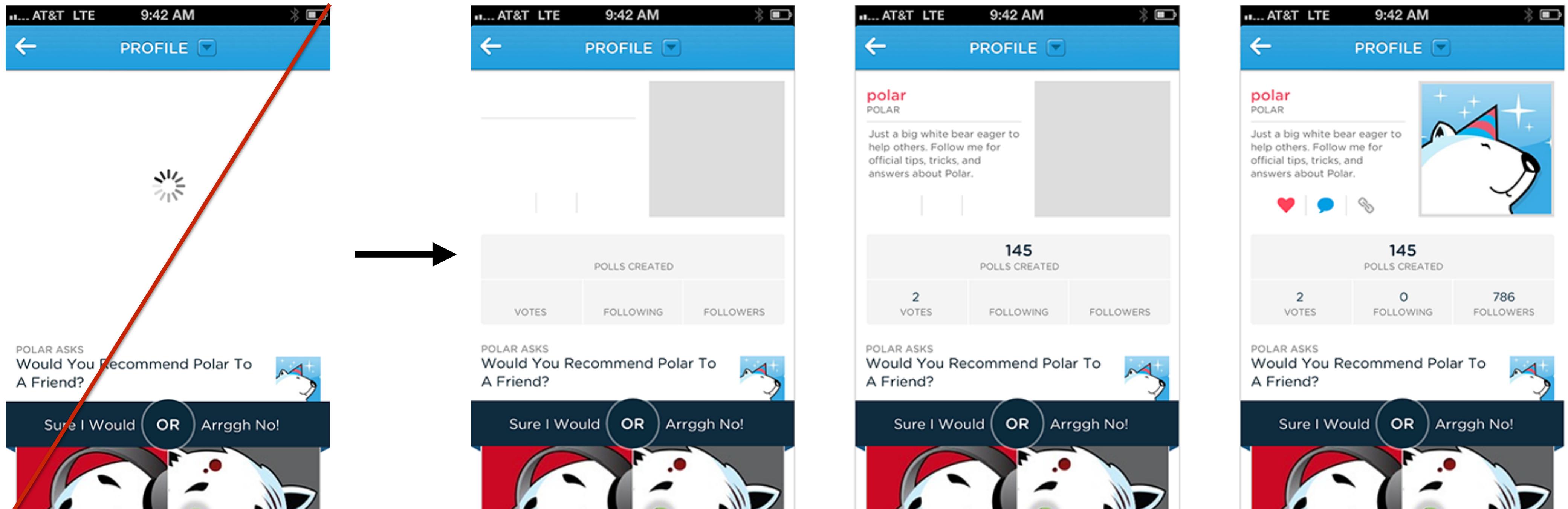
The path to a Progressive Web
App is much more important
than the destination

Jason Grigsby

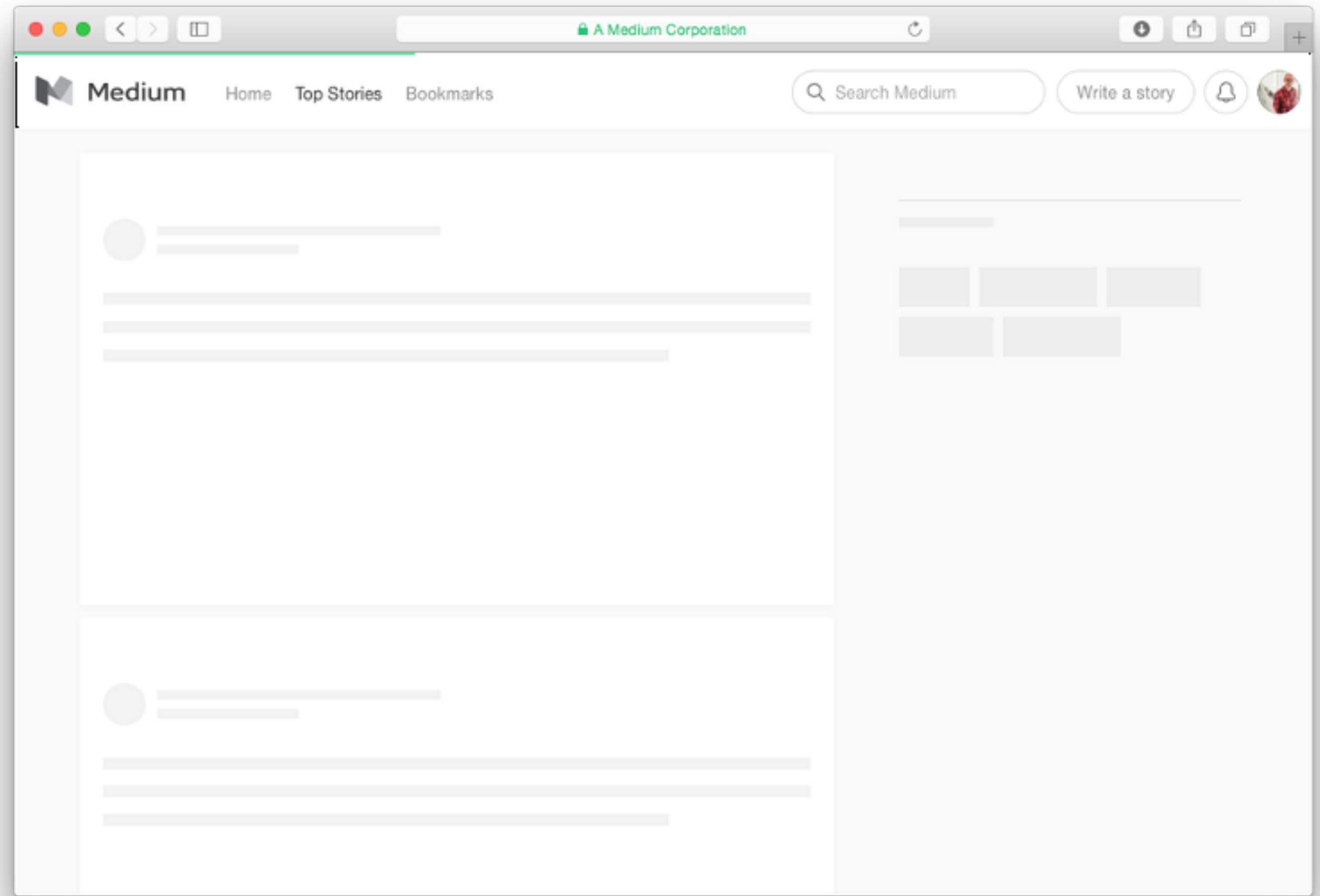
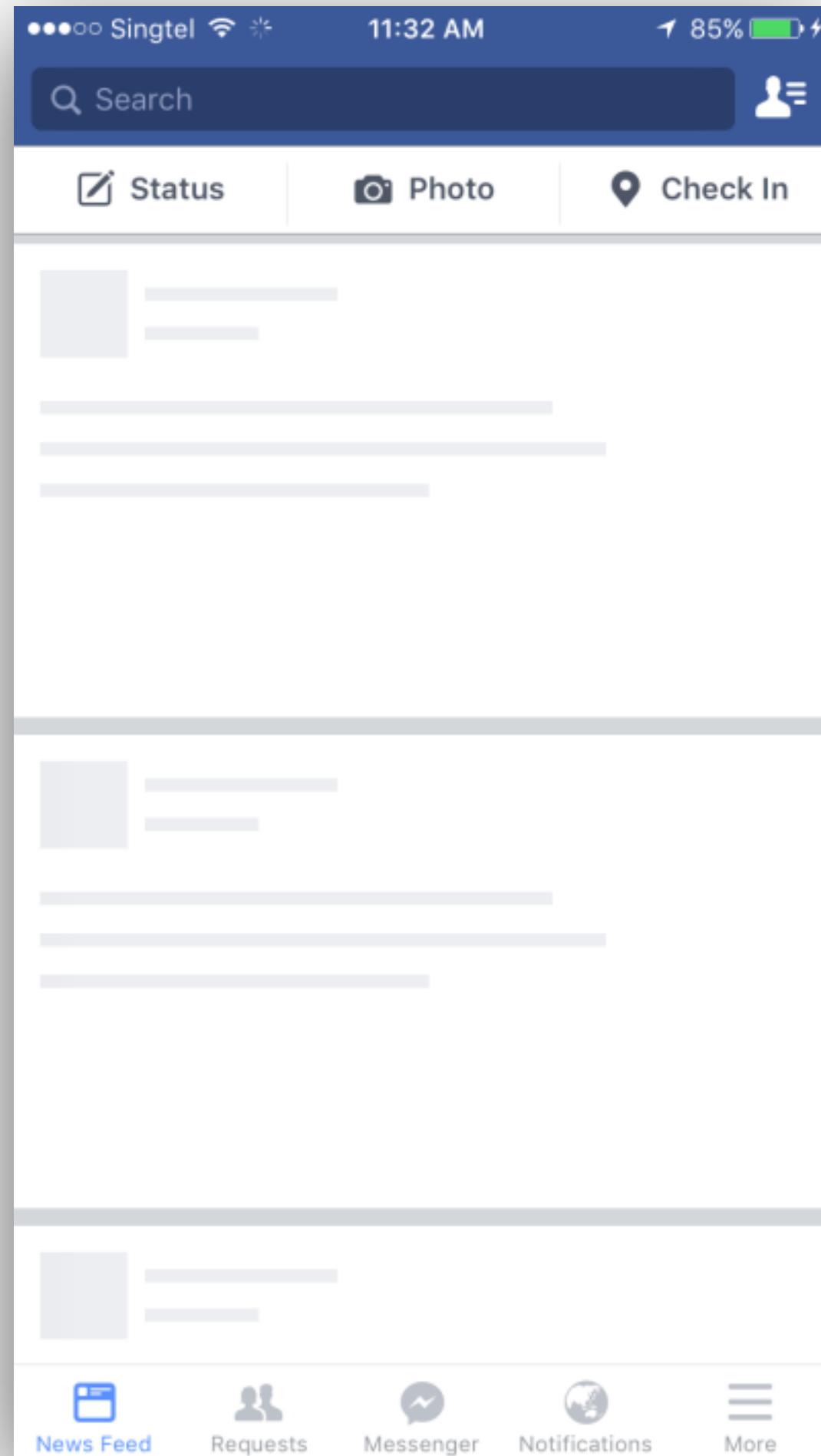
APP UX PATTERNS



SKELETONS



SKELETONS

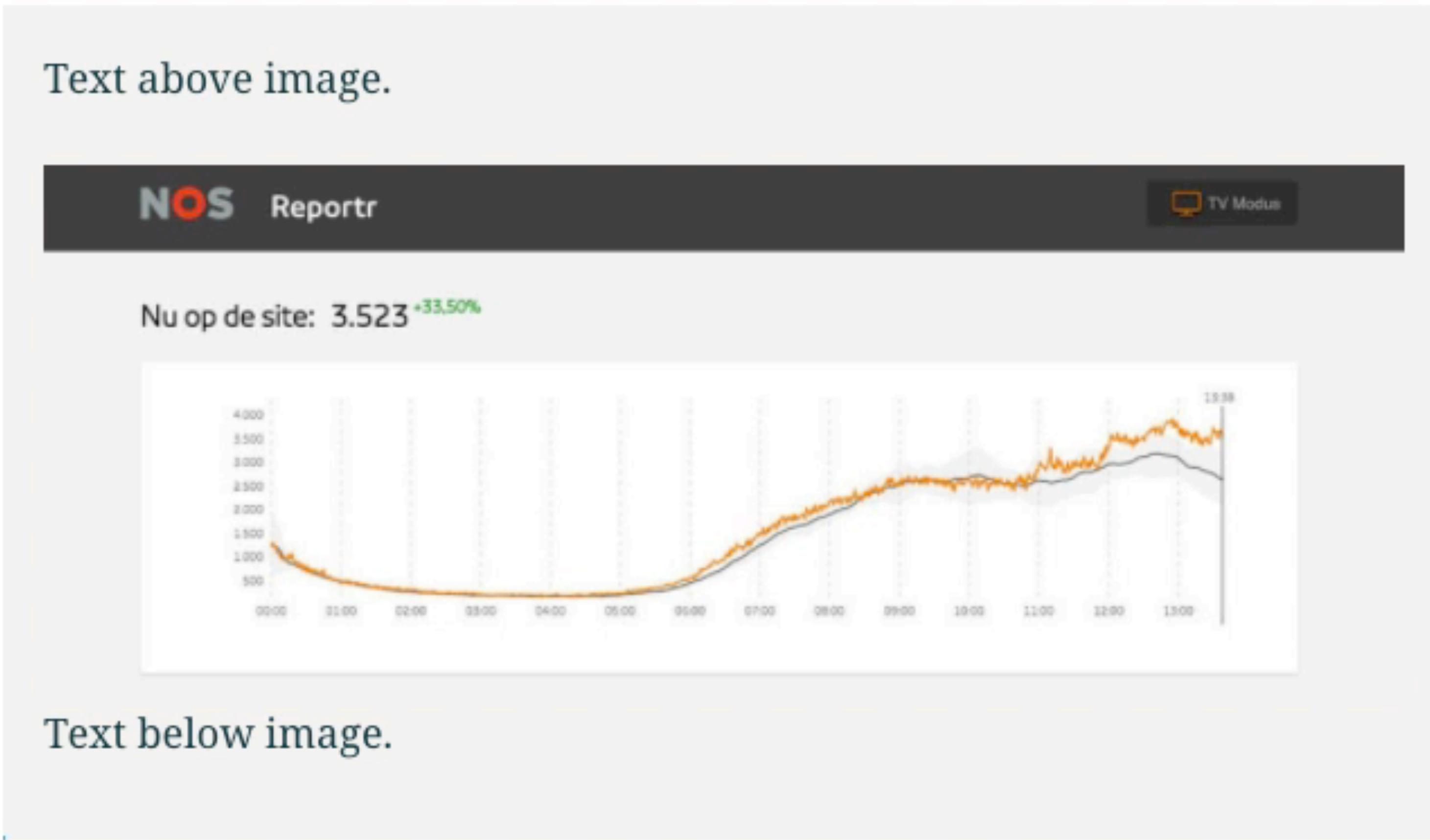


NO REFLOWS

The screenshot shows a web browser window with the URL aftonbladet.github.io/demos/responsive-images/reflow.html/demo in the address bar. The page itself is titled "Responsive Images: Reflow demo" and features the Smashing Magazine logo. Below the title, there is a warning message: "WARNING: This page will reflow". It includes instructions: "Load page and scroll down.", "Images are loaded with 500ms delay to simulate a slow connection", and a link "Back to article". A large image of a man looking stressed is displayed, with the text "Load page and scroll down" overlaid on it. The browser's toolbar is visible at the top.

smashingmagazine.com/2013/09/responsive-images-performance-problem-case-study

FIXED RATIO IMAGE



Fixed image *ratio* prevent text reflow.

Jasper says no to image reflow

PLACEHOLDER IMAGE

A random Medium post

PLACEHOLDER COLOR

A random Google images search

SYSTEM FONTS

The quick brown fox jumps over the lazy dog.

Fira Sans Firefox OS

The quick brown fox jumps over the lazy dog.

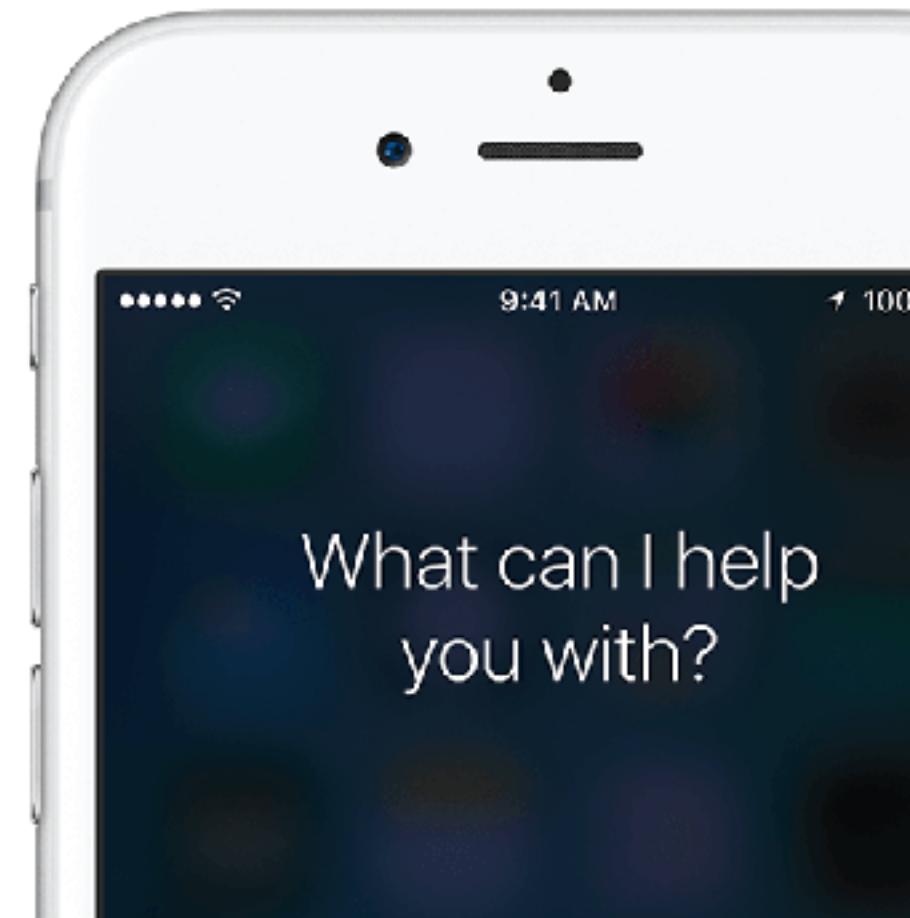
Roboto Android and Chrome OS

The quick brown fox jumps over the lazy dog.

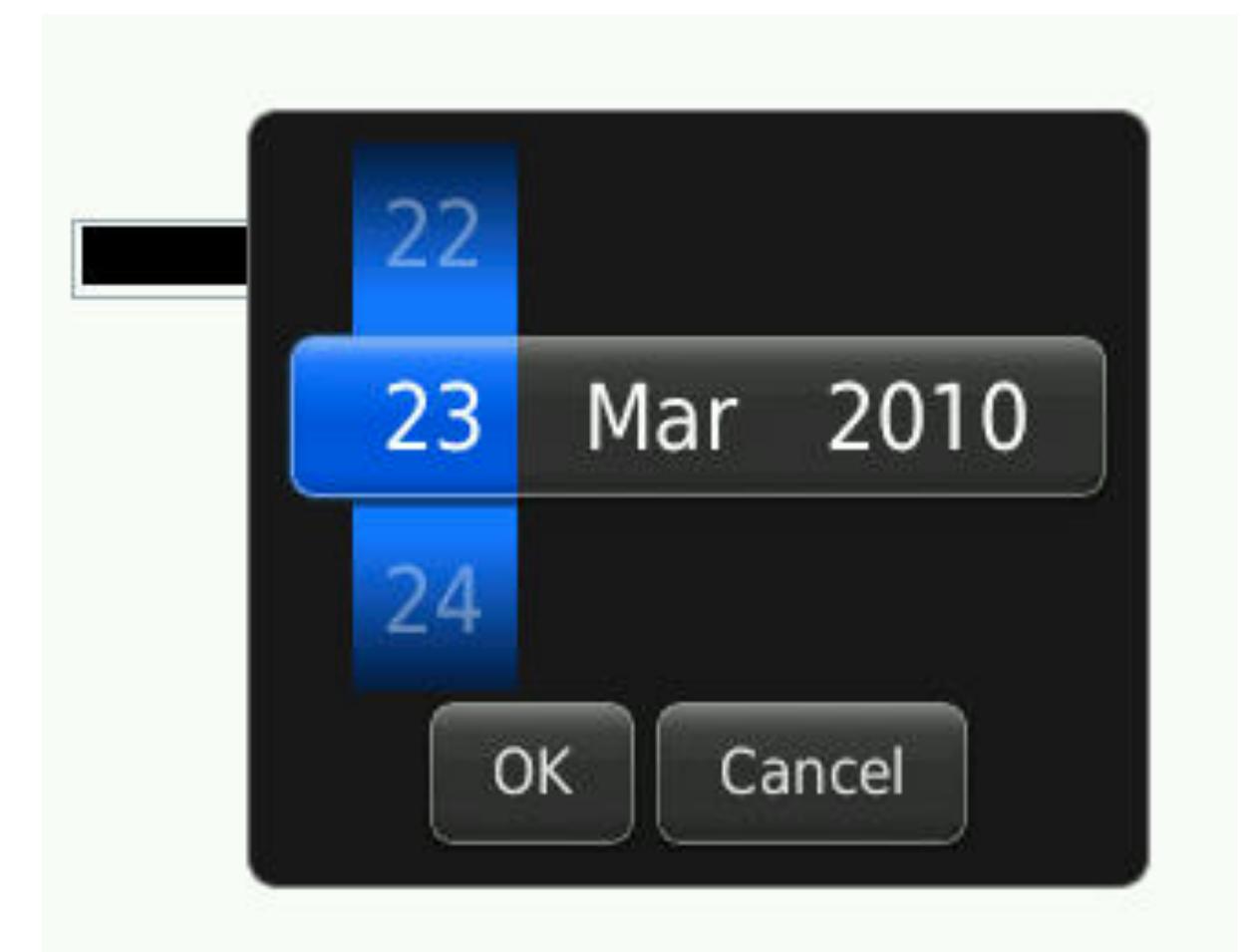
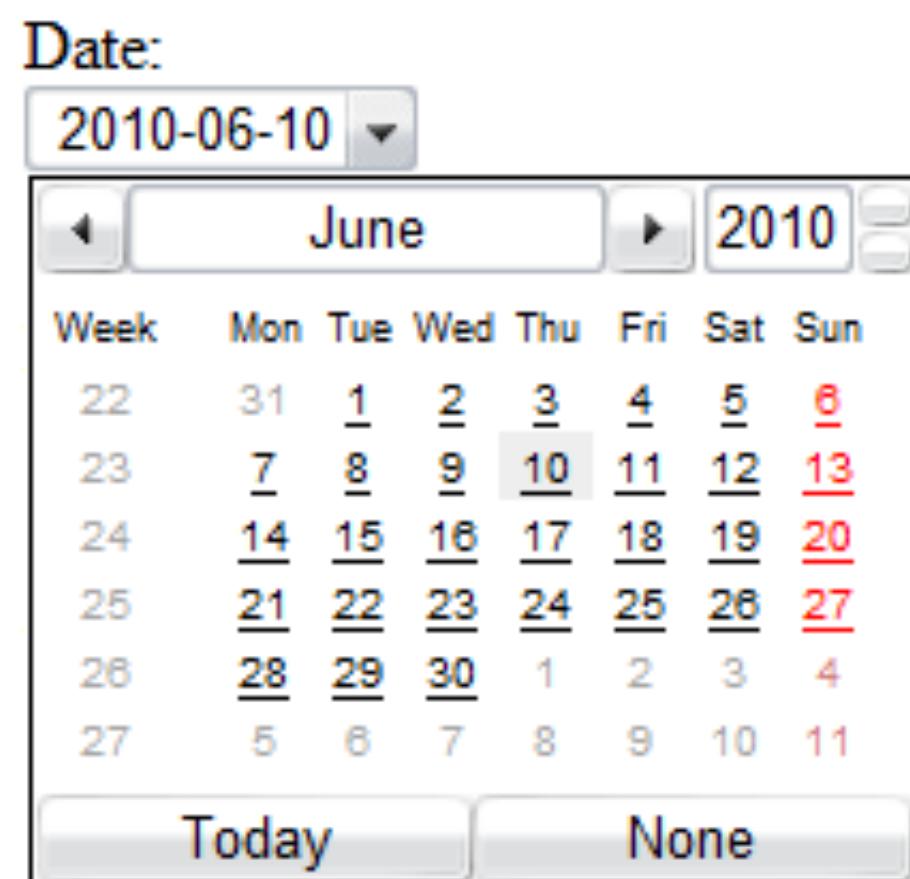
San Francisco iOS and Mac OS

The quick brown fox jumps over the lazy dog.

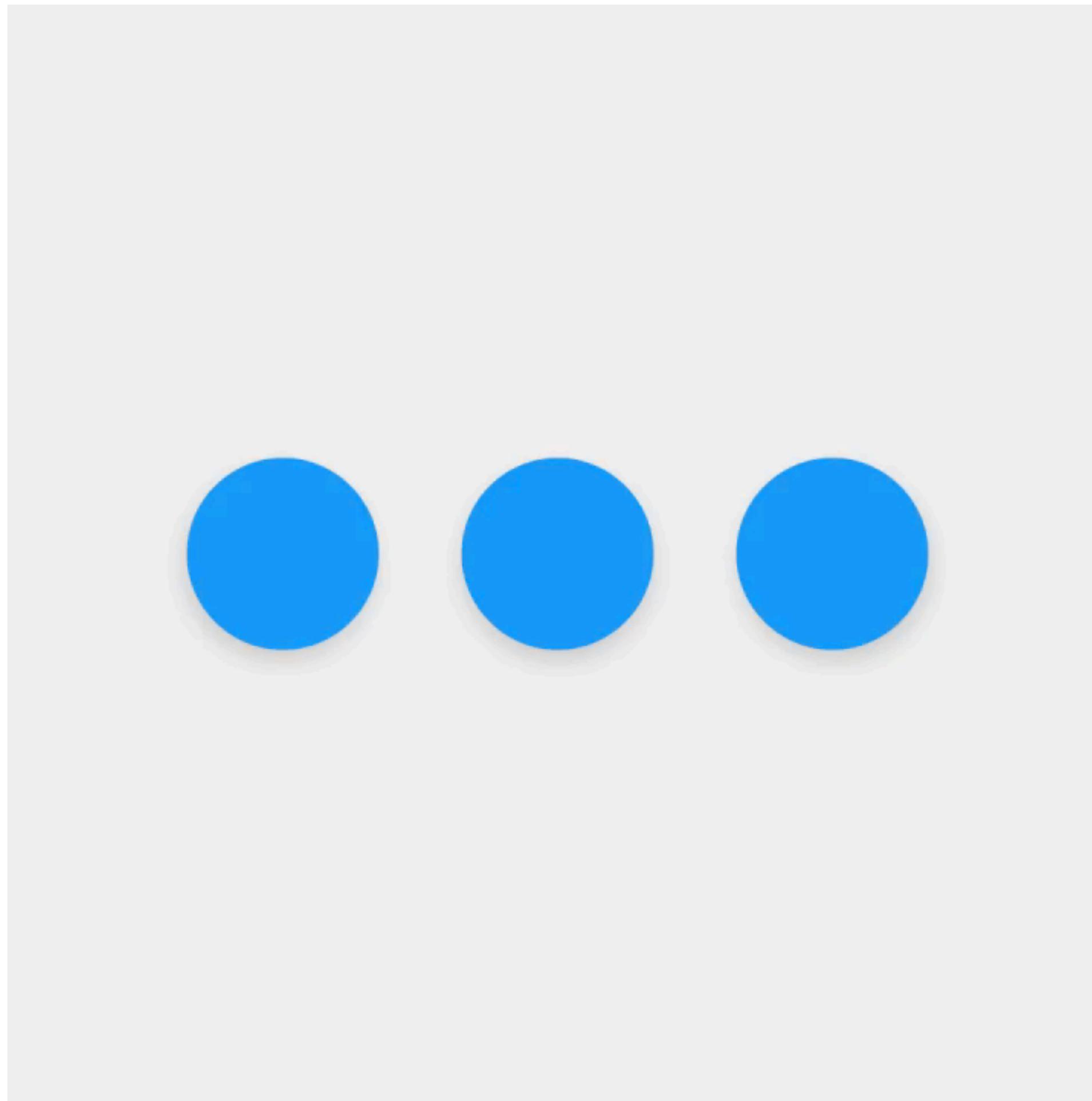
Segoe UI Windows and Windows Phone



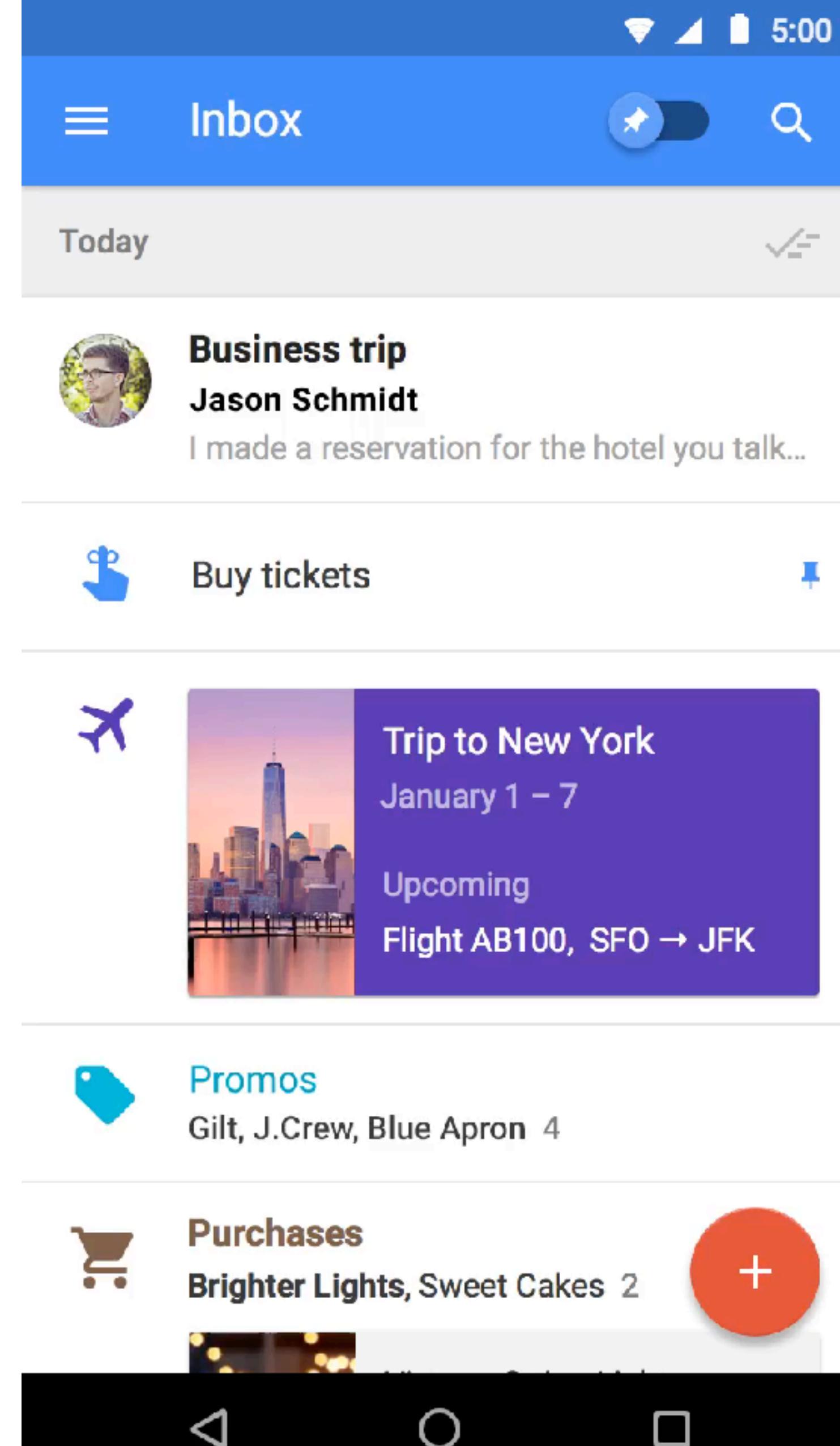
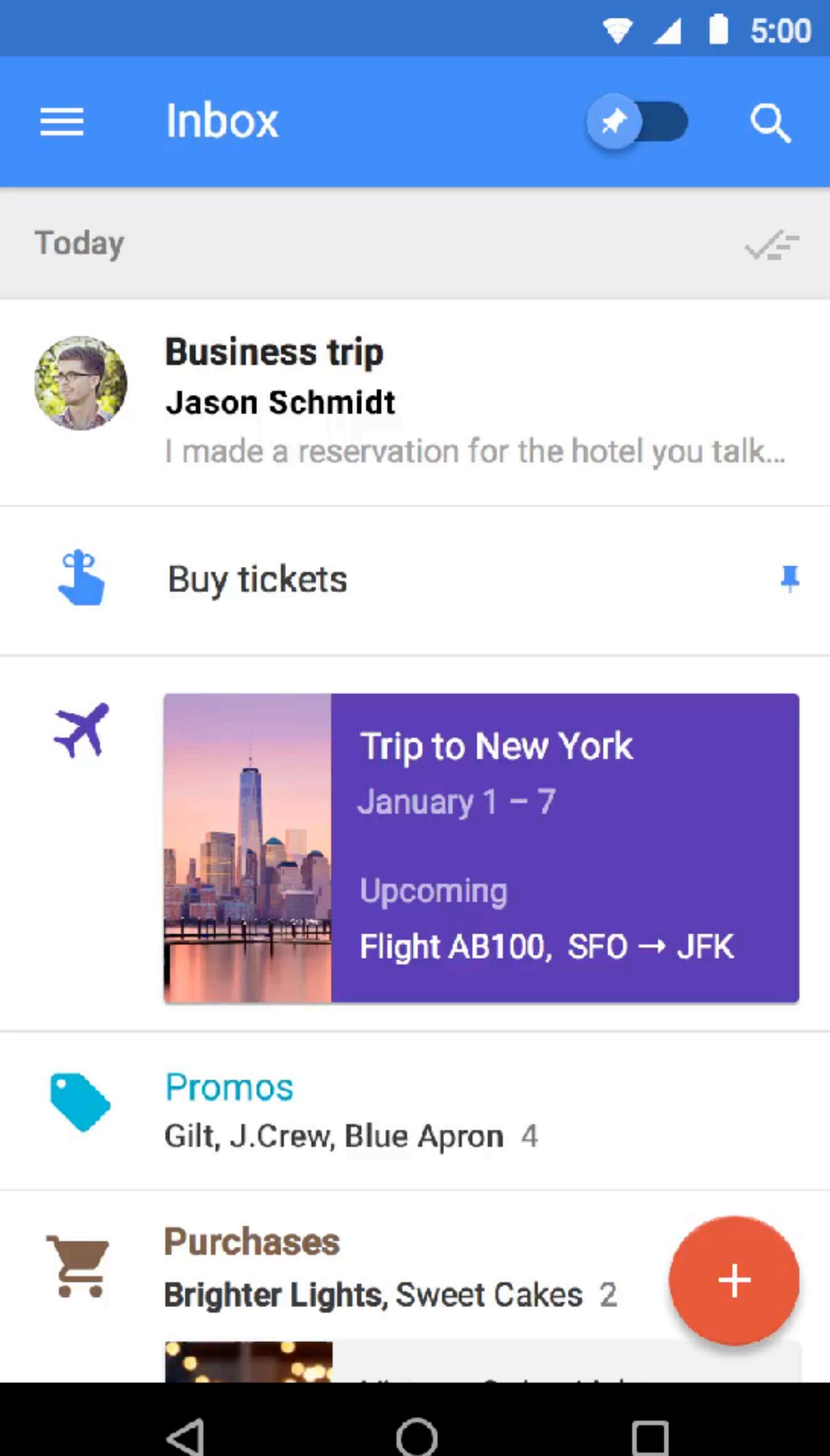
NATIVE INPUT TYPES



SMOOTH ANIMATIONS

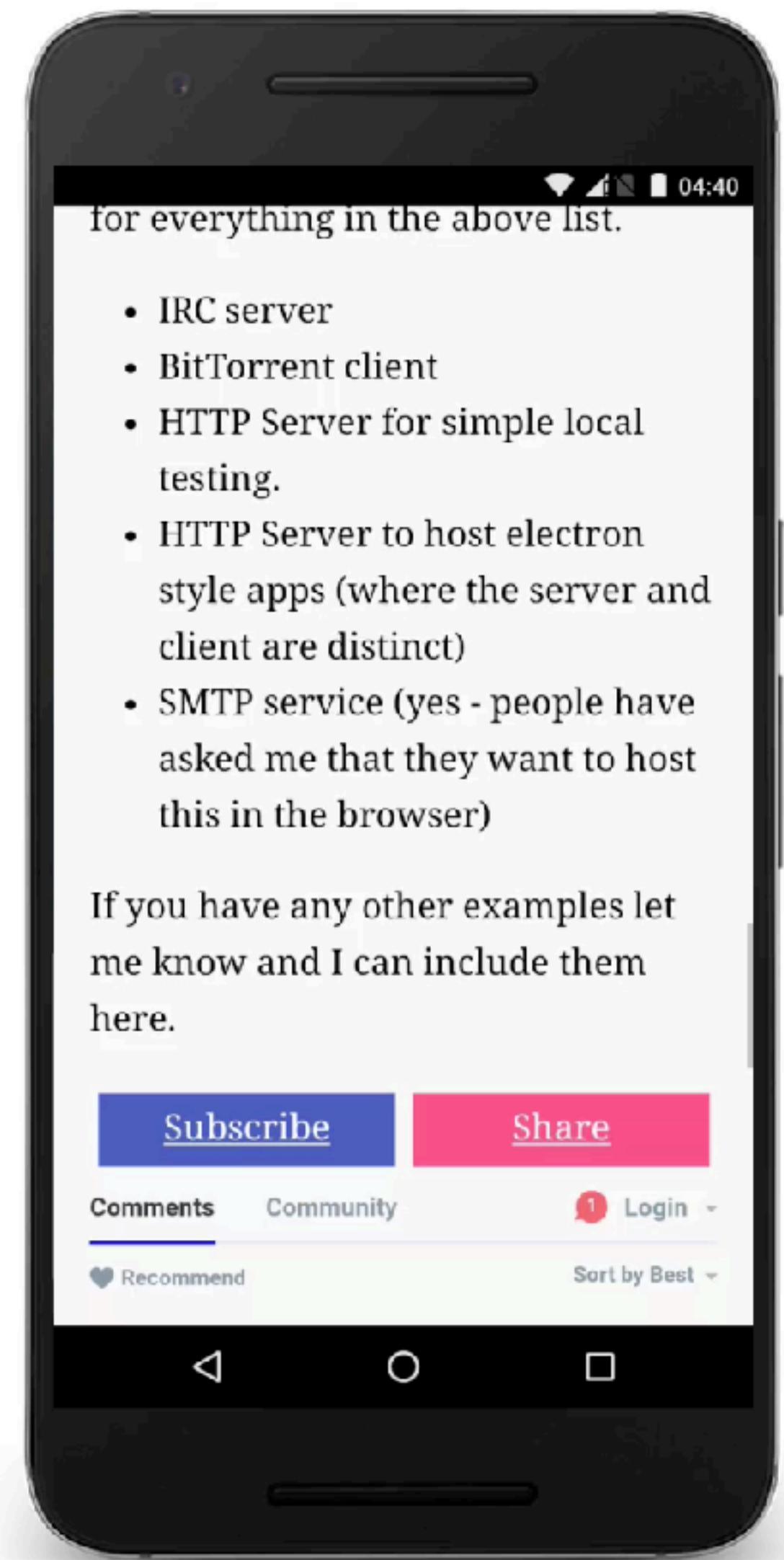


material.google.com/motion



Motion material

NATIVE SHARE



paul.kinlan.me/navigator.share

PWA LIBRARIES



UP UP

The image shows a split-screen view. On the left, a code editor window titled 'index.html' is displayed, showing the following HTML code:

```
18 <li>
19     Hotel Trivelli</h3>
21     <h4>391 reviews</h4>
22     <p>Piazza Barberini 11, Rome, Italy</p>
23 </li>
24 <li>
25     Le Domus del Senato</h3>
27     <h4>221 reviews</h4>
28     <p>Via Tor de Conti 22, Rome, Italy</p>
29 </li>
30 </ul>
31 </div>
32 </div>
33 </body>
34 </html>
```

On the right, a white iPhone displays a mobile web application. The header says 'Cartel' with the time '9:19 PM' and battery level '22%'. The URL 'https://www.lonelyglobe.com' is shown. The main content is titled 'Top Hotels in Rome'. It lists two hotels: 'Villa Domus' and 'Hotel Trivelli'. Each hotel card includes a thumbnail image, the hotel name, a star rating (4 stars for Villa Domus, 5 stars for Hotel Trivelli), the number of reviews (324 for Villa Domus, 391 for Hotel Trivelli), and the address ('Via Piacenza 9, Rome, Italy' for Villa Domus, and 'Piazza Barberini 11, Rome, Italy' for Hotel Trivelli).

SW TOOLBOX

```
importScripts('/sw-toolbox.js');

toolbox.precache([
  '/offline/',
  '/index.css',
  '/index.js'
]);

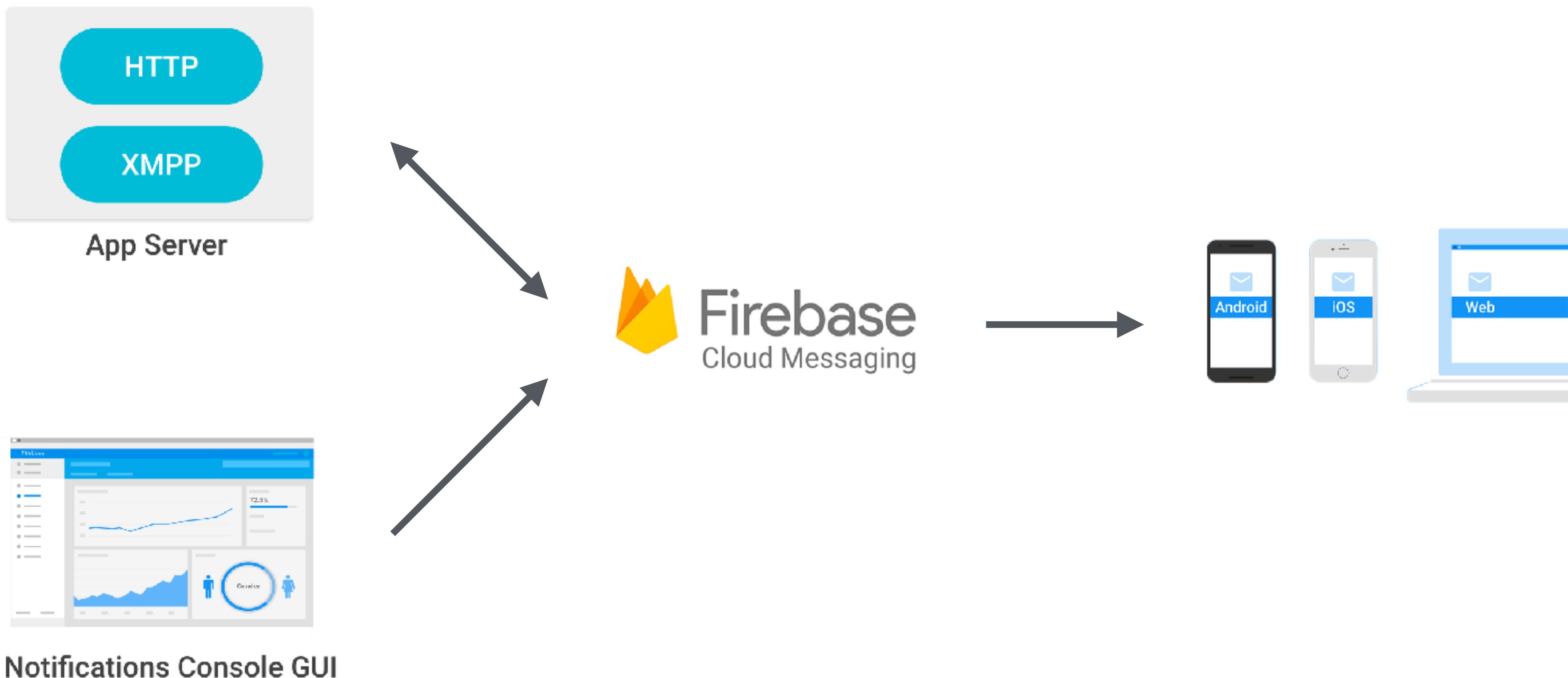
toolbox.router.get('/assets/*', toolbox.cacheFirst);

toolbox.router.get('*', req => {
  const isHtmlRequest = (req.mode === 'navigate');
  if (!isHtmlRequest) {
    return toolbox.networkOnly(req);
  }
  return toolbox.networkFirst(req, [], {
    cache: { name: 'app-v1-pages', maxAgeSeconds: 7 * 24 * 60 * 60 },
    networkTimeoutSeconds: 10
  })
  .catch(() => toolbox.cacheOnly('/offline/'));
});
```

MORE GOOGLE SW LIBRARIES

- **SW Precache** generates service worker code that will precache specific resources so they work offline.
- **SW Helpers** is a collection of packages for different PWA strategies (status: experimental)
- **Offline Google Analytics** queues analytics requests and retries when online (part of SW helpers)

FIREBASE FCM



firebase.google.com/docs/cloud-messaging/

ONE SIGNAL



High volume, cross platform
push notification delivery

An Android smartphone displaying its home screen with a push notification from "DIVER DOGS" at 6:15 PM. The notification says: "You're back in the game! popfiz24 just rescued your dog." A red "Get Started" button is at the bottom.

Android

Get Started

An iOS smartphone displaying its home screen with a push notification from "DIVER DOGS" at 19:56. The notification says: "You're back in the game! popfiz24 just rescued your dog." A red "Get Started" button is at the bottom.

iOS Supports iOS 10

Get Started

A desktop computer monitor displaying a web browser window. A push notification from "OneSignal Web Push Notifications" is visible in the top right corner of the screen. A red "Get Started" button is at the bottom.

Web Push

Get Started

onesignal.com

MORE RESOURCES



MORE RESOURCES

- **Awesome PWAs** curated collection of PWA resources.
- **Awesome Service Workers** collection of SW resources.
- **Offline cookbook** by Jake Archibald.
- **Service Worker cookbook** by Mozilla.
- **PWA libraries in Production** by Addy Osmani.
- **Testing Service Workers** by Matt Gaunt.



DE VOORHOEDE

front-end developers