

# FROM WEB TO APP



# APP(LICATION)

*“a self-contained program or piece of software designed to fulfil a particular purpose”*

— Google

# NATIVE APPS?

installed on device  
and built with  
**platform specific  
technology**

# **WEBSITES / WEB APPS?**

anything we can  
build with

**web technology**

# HYBRID APPS?

web apps running  
in **embedded browser**  
inside a native app

# 1<sup>ST</sup> CLASS APPS?

always available

easily accessible

always up-to-date

adapts to screen

access device in-/outputs

communicate with other apps

can be fullscreen

discoverable

...

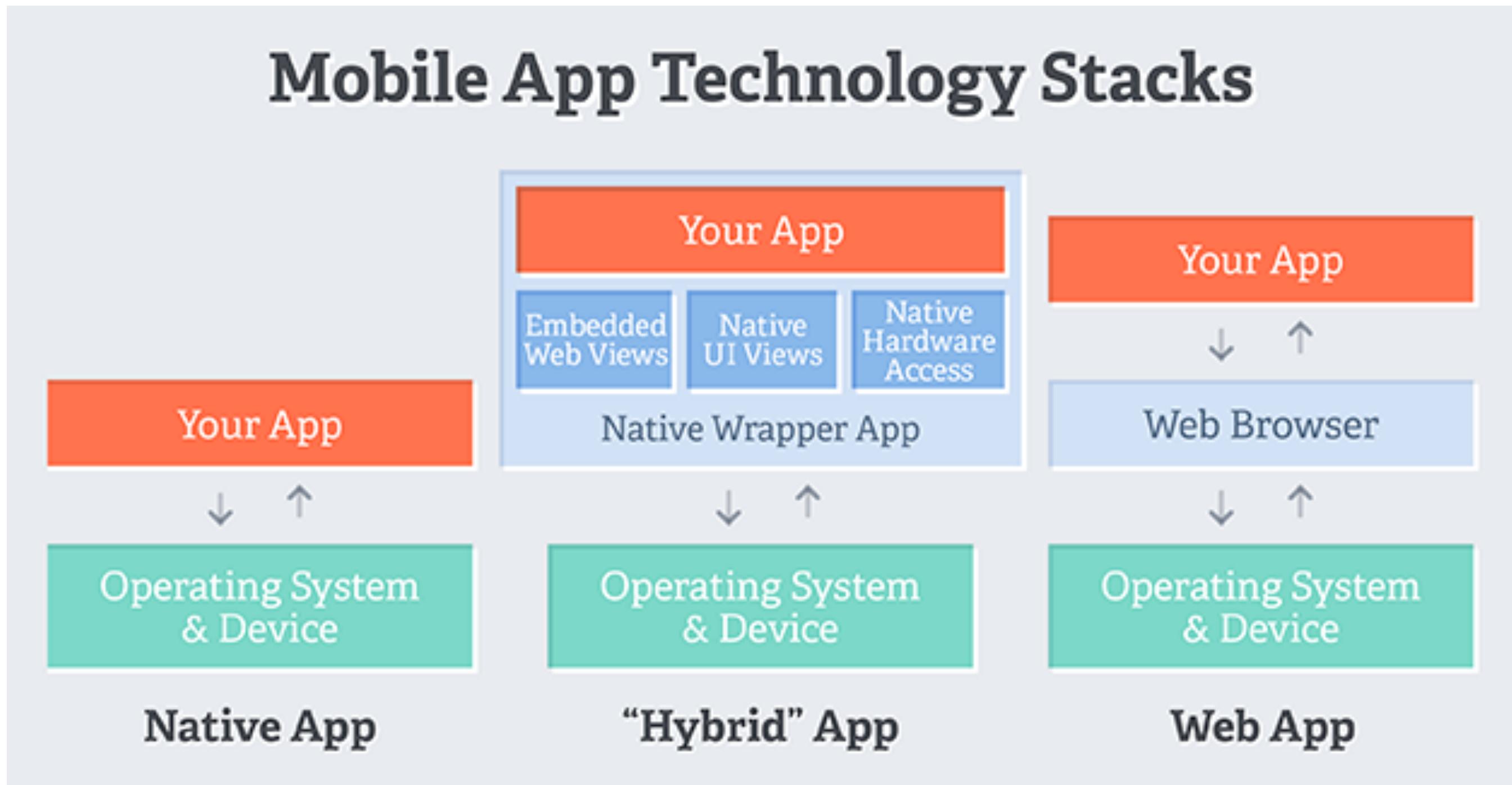
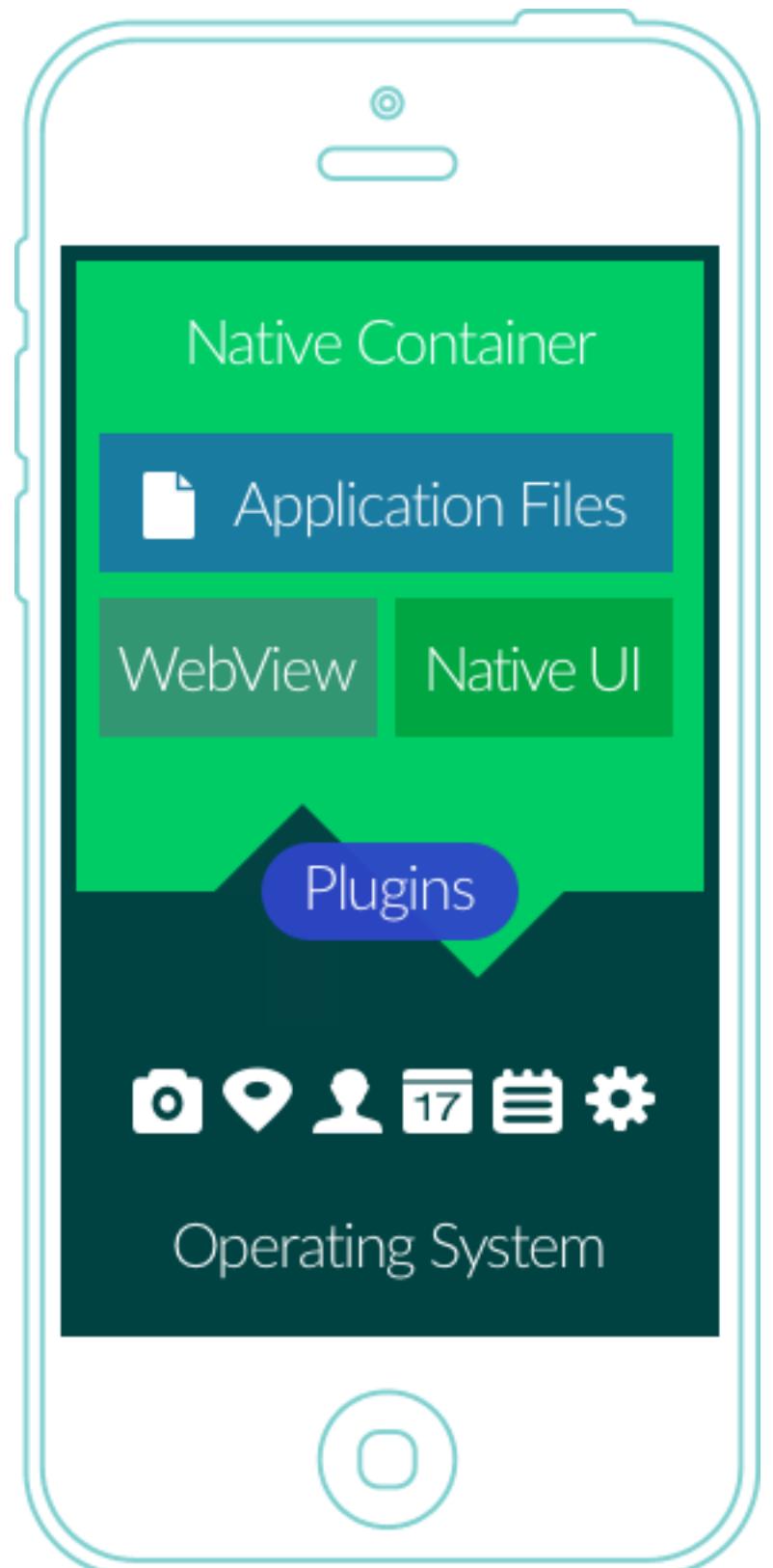
# WEB'S ROAD TO 1<sup>ST</sup> CLASS

- 
- Chrome Apps
  - IE Pinned Sites
  - Metro Apps
  - Firefox OS Apps
  - Hosted Web Apps
  - Hybrid Mobile Apps
  - Electron Apps
  - Progressive Web Apps

# HYBRID MOBILE APPS



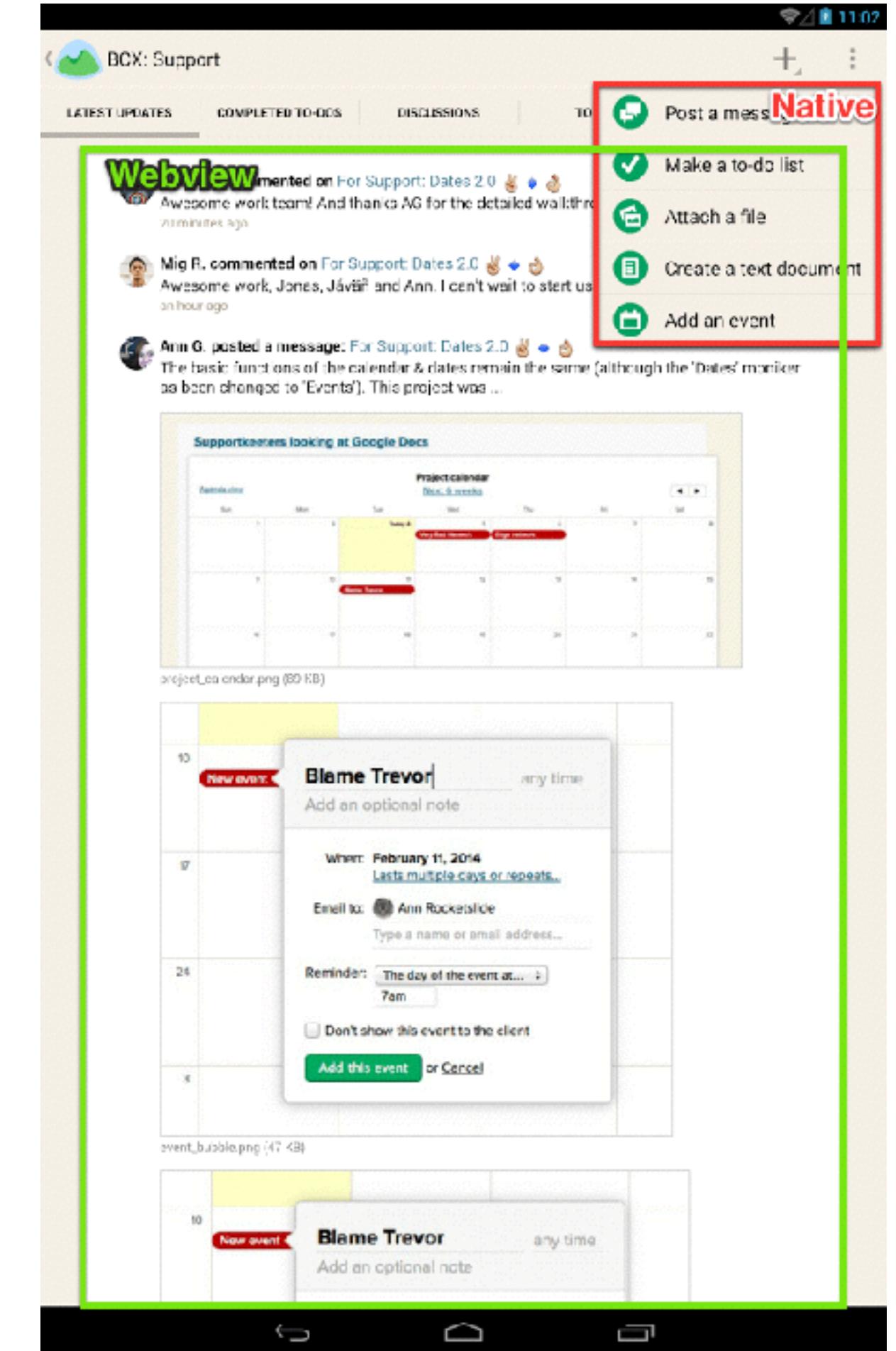
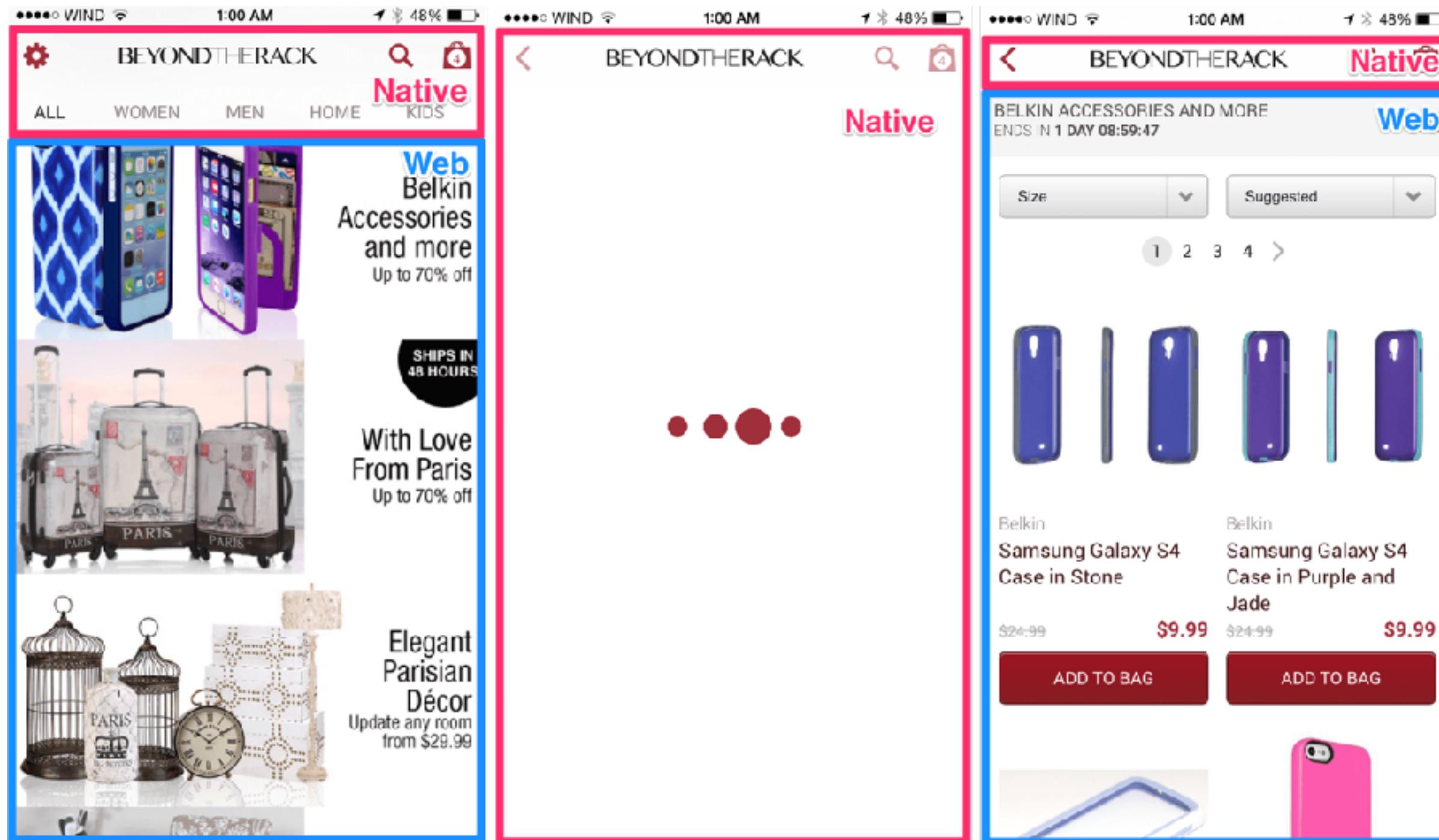
# EMBEDDED WEB VIEWS



[telerik.com/featured/what-is-a-hybrid-mobile-app](http://telerik.com/featured/what-is-a-hybrid-mobile-app)

[telerik.com/featured/what-is-a-webview](http://telerik.com/featured/what-is-a-webview)

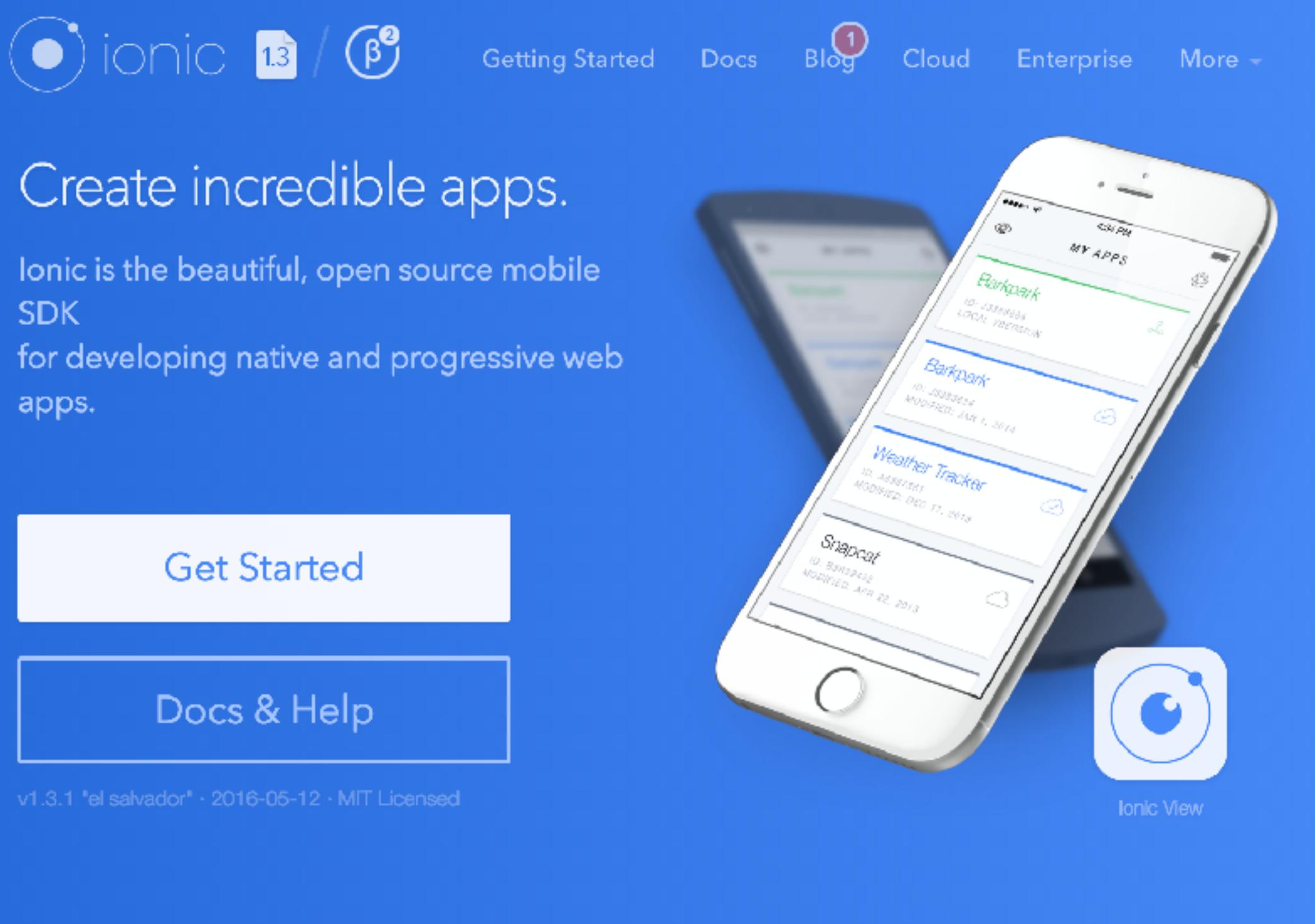
# PART WEB, PART NATIVE



# EXAMPLES

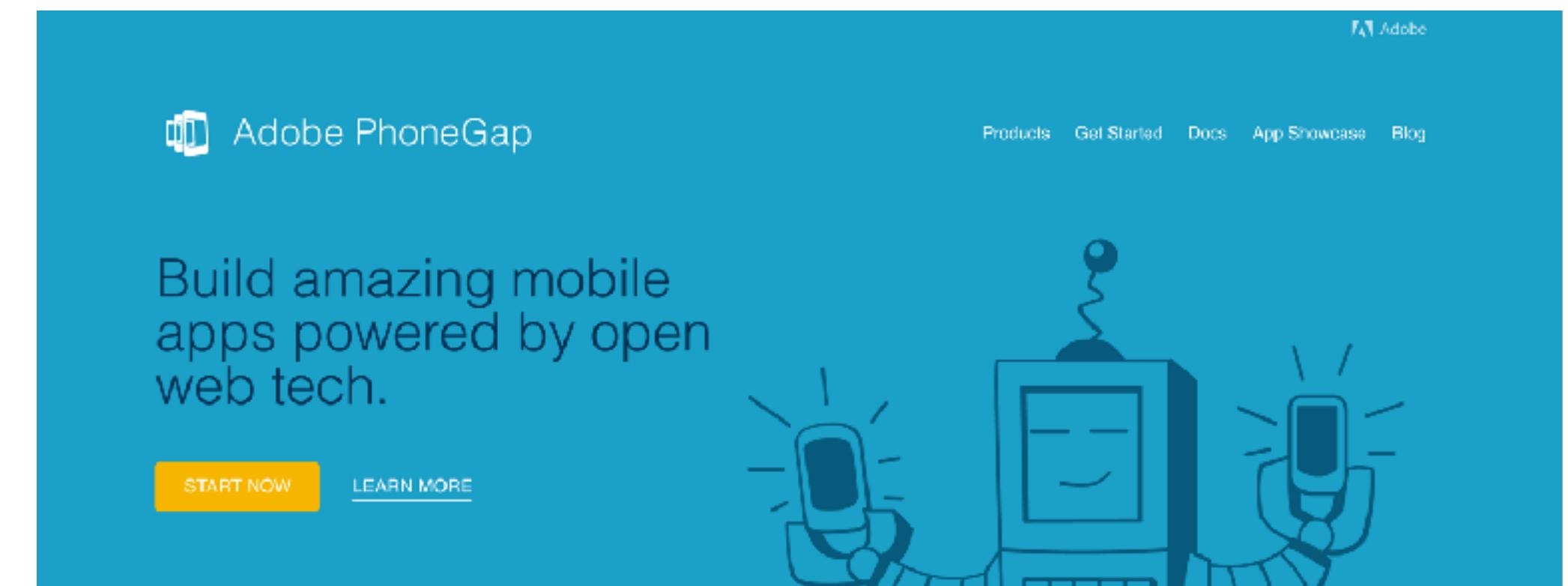


# FRAMEWORKS

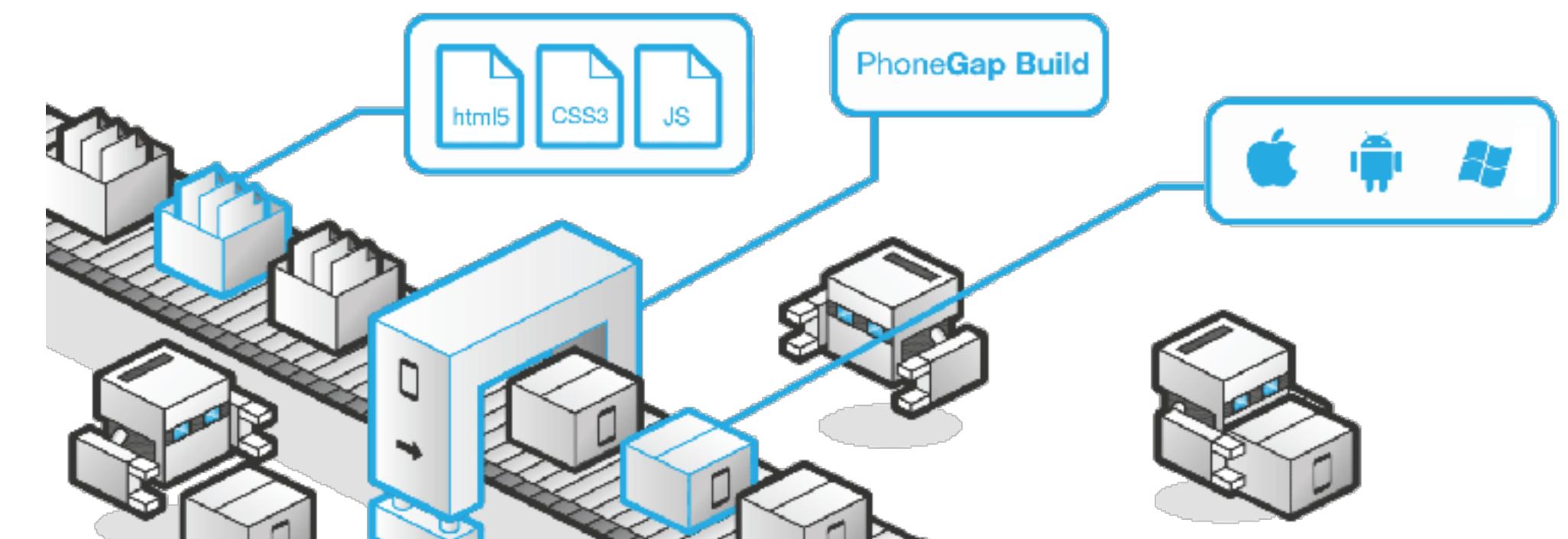


The Ionic Framework homepage features a blue header with the Ionic logo and version 1.3. A navigation bar includes links for Getting Started, Docs, Blog (with 1 notification), Cloud, Enterprise, and More. Below the header, a large smartphone displays a mobile application interface with three cards: "Barkpark", "Weather Tracker", and "Snapshot". To the left, text reads "Create incredible apps." and "Ionic is the beautiful, open source mobile SDK for developing native and progressive web apps." A "Get Started" button is highlighted in white, and a "Docs & Help" button is in blue. At the bottom, a footer note says "v1.3.1 'el salvador' · 2016-05-12 · MIT Licensed".

[ionicframework.com](http://ionicframework.com)



The Adobe PhoneGap homepage has a teal header with the Adobe logo and "Adobe PhoneGap". A navigation bar includes links for Products, Get Started, Docs, App Showcase, and Blog. The main content area features the text "Build amazing mobile apps powered by open web tech." with "START NOW" and "LEARN MORE" buttons. To the right, there's a cartoon illustration of a robot holding a smartphone.



[phonegap.com](http://phonegap.com)

# APACHE CORDOVA (2016-09)

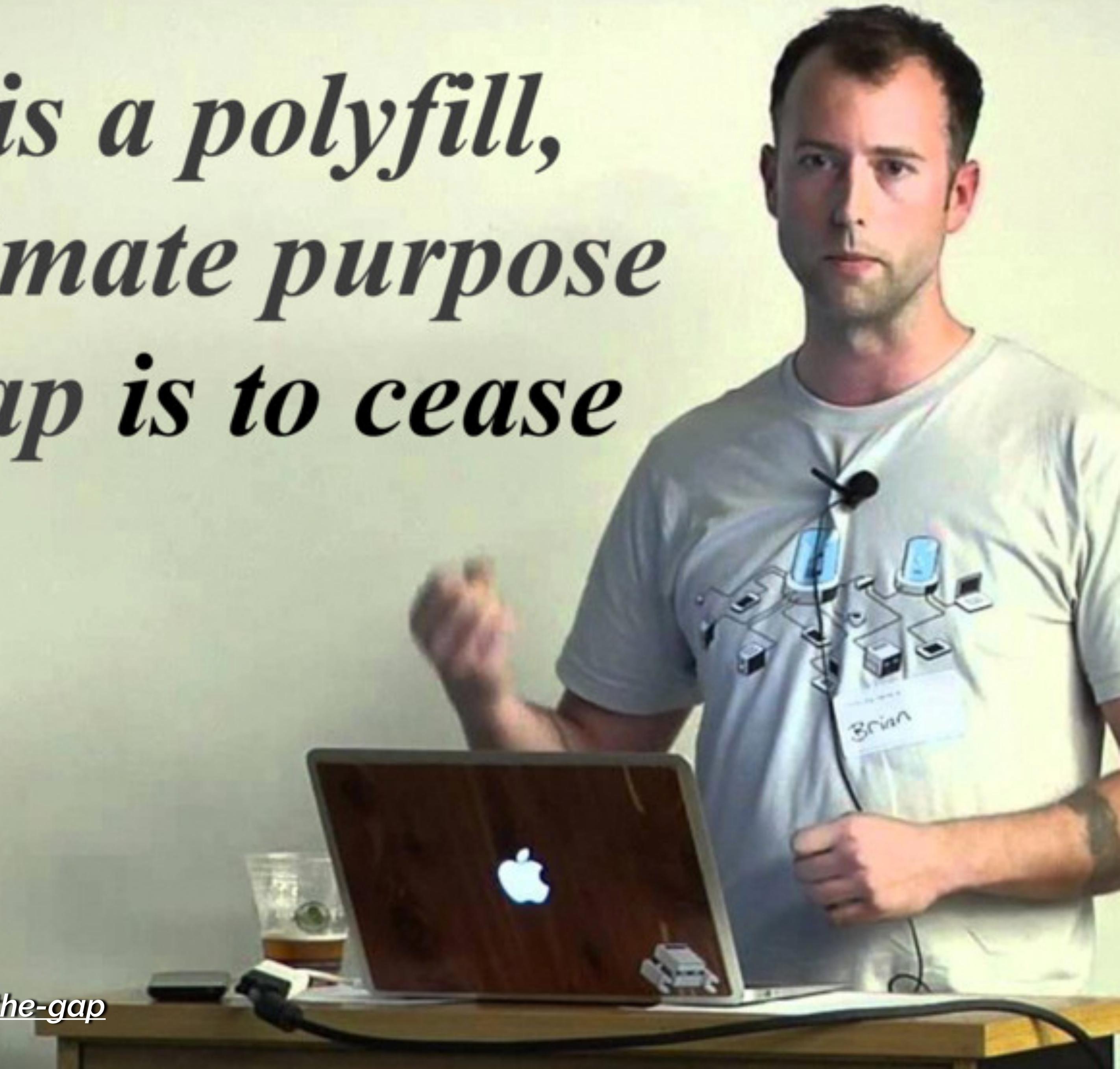
## Supported platforms [ edit ]

Apache Cordova currently supports development for the operating systems Apple iOS, Bada, BlackBerry, Firefox OS,<sup>[30]</sup> Google Android,<sup>[31]</sup> LG webOS, Microsoft Windows Phone (7 and 8), Nokia Symbian OS, Tizen (SDK 2.x), and Ubuntu Touch. The table below is a list of supported features for each operating system.<sup>[32][33]</sup>

Feature	Android <sup>[34]</sup>	Apple iPhone /iPhone 3G	Apple iPhone 3GS and newer	Bada	BlackBerry 10 and PlayBook OS	BlackBerry OS 4.6–4.7	BlackBerry OS 5.0-6.0+	Firefox OS	Symbian	Tizen	webOS	Ubuntu Touch	Windows Phone
Accelerometer	Yes	Yes	Yes	Yes	Yes	N/A	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Camera	Yes	Yes	Yes	Yes	Yes	N/A	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Compass	Yes	N/A	Yes	Yes	Yes	N/A	N/A	Yes	N/A	Yes	Yes	Yes	Yes
Contacts	Yes	Yes	Yes	Yes	Yes	N/A	Yes	Yes	Yes	Yes	N/A	N/A	Yes
File	Yes	Yes	Yes	N/A	Yes	N/A	Yes	N/A	N/A	Yes	N/A	Yes	Yes
Geolocation	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Media	Yes	Yes	Yes	N/A	Yes	N/A	N/A	N/A	N/A	Yes	N/A	Yes	Yes
Network	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Notification (alert, sound, vibration)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Storage	Yes	Yes	Yes	N/A	Yes	N/A	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*“PhoneGap is a polyfill,  
and the ultimate purpose  
of PhoneGap is to cease  
to exist.*

*Brian LeRoux,  
SPACELORD!1!!  
Adobe, 2012.*



# WHAT WEB CAN DO TODAY



# WEB TECHNOLOGY

The Web platform: Browser technologies

**Core platform**

- HTML
- DOM
- ECMAScript
- URL
- Fetch (includes CORS)
- XMLHttpRequest
- Encoding

**CSS features**

- CSS roadmap
- Animations
- Background-image options
- Border images
- Border radius (rounded corners)
- Box shadows
- Box sizing
- Cascading and inheritance
- Colors
- Compositing and Blending
- Device Adaptation
- Downloadable fonts (@font-face)
- Exclusions
- Feature queries (@supports)
- Filter Effects
- Fixed positioning (position:fixed)
- Flexible box layout (Flexbox)
- Font-feature settings
- Font loading
- Gradients
- Grid layout
- Hyphenation
- Image Values and Replaced Content
- Logical properties
- Masking
- Media Queries
- Motion paths
- Multiple-column layout
- Multiple backgrounds
- Opacity
- Overflow
- Pointer events

**Graphics and typography**

- Canvas
- WebGL
- SVG
- WOFF
- MathML
- Web Animations

**Media**

- Web Audio API
- WebVTT
- Media Source Extensions
- Media Fragments

**Platform interaction, events, messaging**

- Notifications API
- Cross-document messaging
- Channel messaging
- Fullscreen API
- Geofencing
- Geolocation
- Device Orientation
- Screen Orientation

**Pseudo-elements**

- Scroll Snap Points
- Selectors
- Shapes
- Sticky positioning (position:sticky)
- Style attributes
- Syntax
- Text decoration
- Text overflow
- Text shadows
- Transforms (2D)
- Transforms (3D)
- Transitions
- Values and Units
- Will Change
- Writing modes
- CSSOM (CSS Object Model)
- CSSOM View Module

**UI Events (formerly DCM Events)**

- Pointer Events
- Touch Events
- Pointer Lock
- Gamepad
- getUserMedia
- Battery Status
- Vibration
- Beacon
- HTML Media Capture (the capture attribute)
- Clipboard API and events

**Storage and Files**

- Storage (NavigatorStorage+StorageManager)
- Web Storage (localStorage)
- Indexed Database
- File API
- Blob URLs
- File Reader

**Real-time communication**

- WebRTC
- Object RTC (ORTC) API for WebRTC
- WebSocket protocol
- WebSocket API
- Server-Sent Events
- Push API

**Web Components**

- Custom Elements
- Shadow DOM
- Templates

**HTML bonus features**

- classList (DOMTokenList)
- dataset (data-\* attributes)
- async for scripts
- defer for scripts
- Session-history management
- hashchange
- Sandboxed Iframe
- Drag and drop
- contentEditable
- HTML Editing APIs

**ARIA**

**Performance optimization and analysis**

- Web Workers
- Shared Workers
- Timing control for script-based animations
- Navigation Timing
- Page Visibility
- User Timing
- Performance Timeline
- High Resolution Time
- SIMD (Single instruction, multiple data)

**Security and privacy**

- Content Security Policy (CSP)
- Upgrade Insecure Requests
- Web Cryptography API
- Referrer policy
- Tracking Preference Expression (DNT)

**Other core-platform bonus features**

- Structured cloning
- Transferable objects
- Mutation observers
- Streams
- DOM Parsing and Serialization
- DOM XPath
- Quirks Mode
- Internationalization API
- Promises
- JSON parsing
- Typed Array
- Service Workers
- querySelector() method
- matches() method
- matchMedia() method
- data URLs

**Various other**

- Web IDL
- Link header
- Content-Disposition header

A feature history of the modern Web Platform

# CHROME, ANDROID (2016-09)

Native Behaviors	Seamless Experience	Camera & Microphone	Location & Position
<ul style="list-style-type: none"><li>LOCAL NOTIFICATIONS ✓</li><li>PUSH MESSAGES ✓</li><li>FOREGROUND DETECTION ✓</li><li>PERMISSIONS ✓</li></ul>	<ul style="list-style-type: none"><li>OFFLINE MODE ✓</li><li>HOME SCREEN INSTALLATION</li><li>BACKGROUND SYNC ✓</li><li>INTER-APP COMMUNICATION ✘</li></ul>	<ul style="list-style-type: none"><li>AUDIO &amp; VIDEO CAPTURE ✓</li><li>ADVANCED CAMERA CONTROLS ✘</li><li>RECORDING MEDIA ✓</li><li>REAL-TIME COMMUNICATION ✓</li></ul>	<ul style="list-style-type: none"><li>GEOLOCATION ✓</li><li>GEOFENCING ✘</li><li>DEVICE ORIENTATION ✓</li><li>DEVICE MOTIONS ✓</li></ul>
Input	Surroundings	Device Features	Screen & Output
<ul style="list-style-type: none"><li>TOUCH GESTURES ✓</li><li>SPEECH RECOGNITION ✓</li><li>CLIPBOARD (COPY &amp; PASTE) ✓</li><li>POINTING DEVICE ADAPTATION ✓</li></ul>	<ul style="list-style-type: none"><li>BLUETOOTH ✓</li><li>NFC ✘</li><li>PROXIMITY SENSORS ✘</li><li>AMBIENT LIGHT ✘</li></ul>	<ul style="list-style-type: none"><li>NETWORK TYPE &amp; SPEED ✓</li><li>ONLINE STATE ✓</li><li>VIBRATION ✓</li><li>BATTERY STATUS ✓</li></ul>	<ul style="list-style-type: none"><li>FULLSCREEN ✓</li><li>SCREEN ORIENTATION &amp; LOCK ✓</li><li>WAKE LOCK ✘</li><li>PRESENTATION FEATURES ✓</li></ul>
 <p>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</p> <p>✓ Feature available in your current browser   ✘ Feature not available in your current browser</p>	Operating System		
	<ul style="list-style-type: none"><li>OFFLINE STORAGE ✓</li><li>FILE ACCESS ✓</li><li>CONTACTS ✘</li><li>STORAGE QUOTAS ✓</li></ul>		

# SAFARI, IOS (2016-09)

Native Behaviors	Seamless Experience	Camera & Microphone	Location & Position
LOCAL NOTIFICATIONS ✗	OFFLINE MODE ✗	AUDIO & VIDEO CAPTURE ✗	GEOLOCATION ✗

Input	Surroundings	Device Features	Screen & Output
TOUCH GESTURES ✗	BLUETOOTH ✗	NETWORK TYPE & SPEED ✗	FULLSCREEN ✗



## 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 ✗

# PROGRESSIVE WEB APPS



# **PROGRESSIVE WEB APPS?**

use the

**latest web technologies**

to create a

**1<sup>st</sup> class app experience**

# THE PWA PROMISE

Progressive

Discoverable

Linkable

Responsive

Connectivity independent

Re-engageable

Installable

Fresh

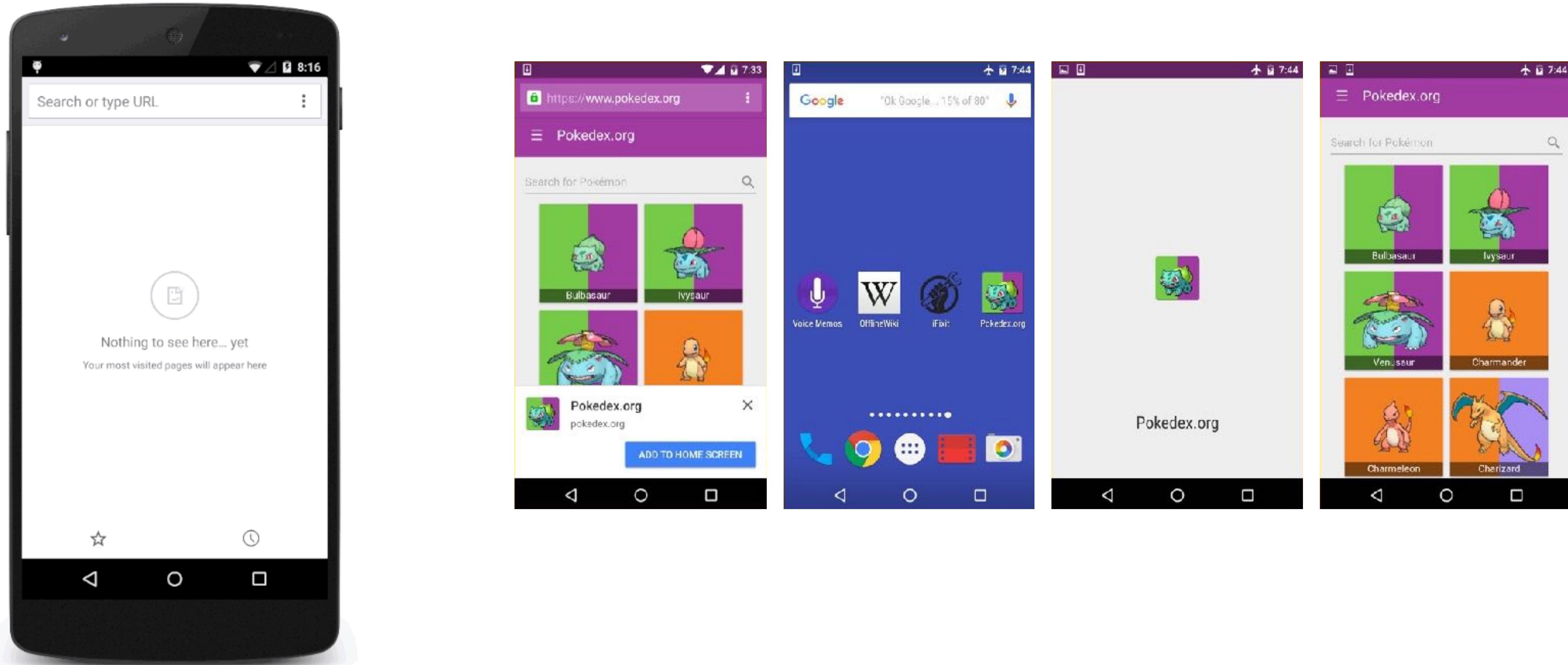
Safe

# STARTS AS WEBSITE

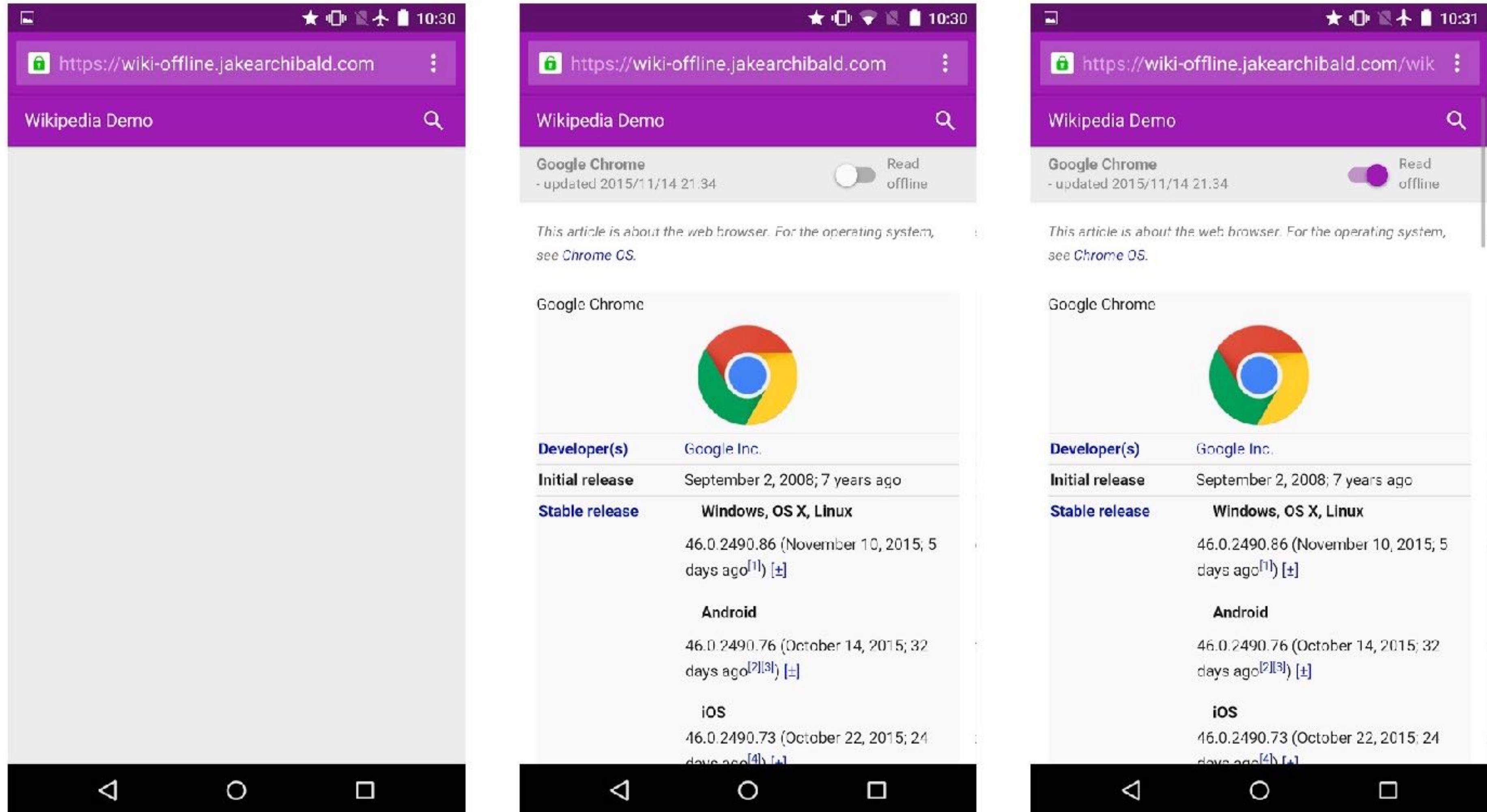
This screenshot shows the Wikipedia article titled "Progressive web app". The page includes a sidebar with navigation links like "Main page", "Contents", and "Interaction". The main content area discusses the evolution of web technology from static websites to dynamic web pages and responsive design. It highlights the shift from static HTML to dynamic technologies like PHP, ASP.NET, and Ajax.

This screenshot shows the Pokédex.org website, which displays a grid of 151 Pokémons. Each Pokémon is represented by a small icon and its name below it. The website has a clean, modern design with a purple header and a search bar. The Pokémons are arranged in a 7x21 grid, though the last few slots are empty.

# ADD TO HOMESCREEN

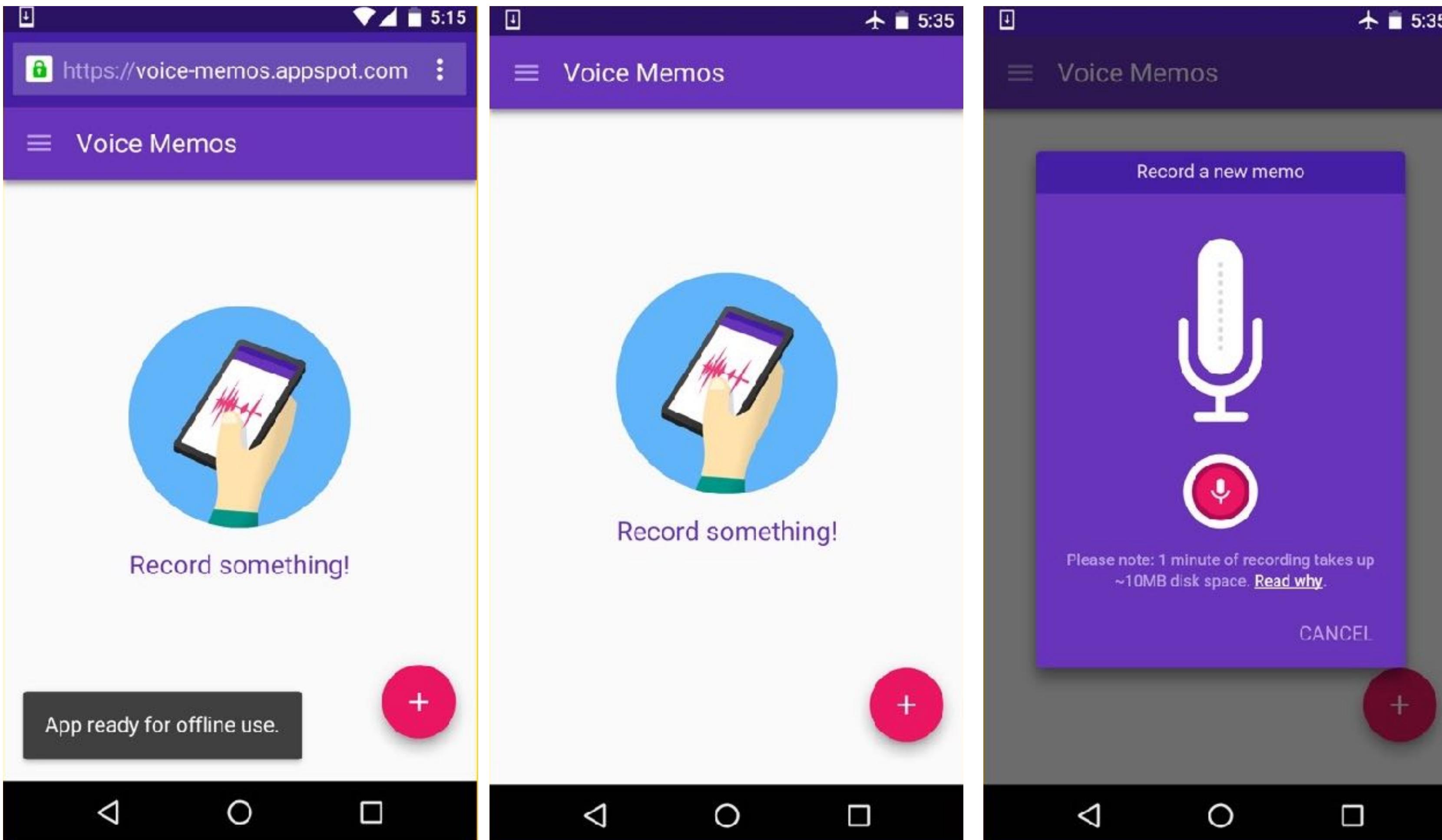


# OFFLINE SUPPORT



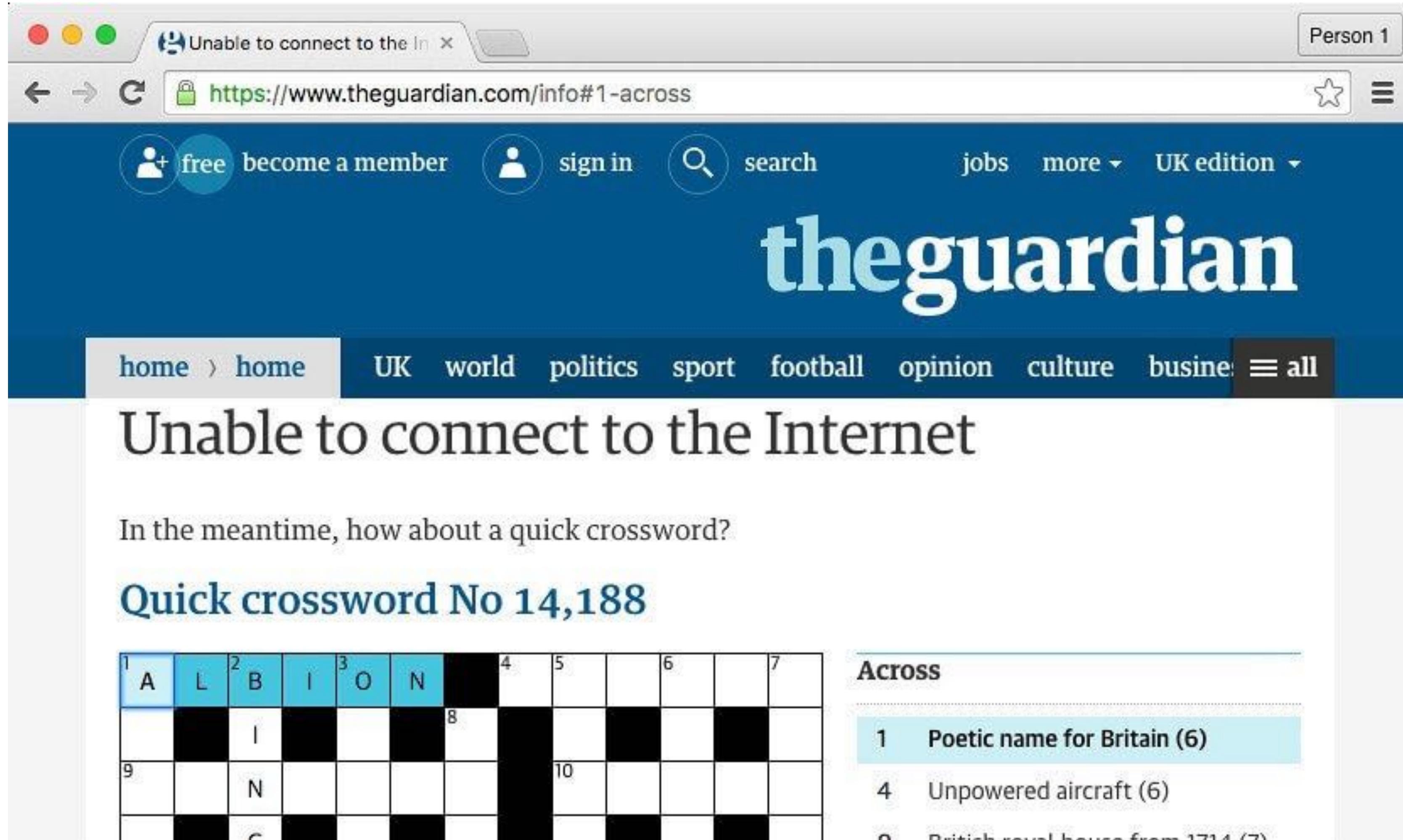
[developers.google.com/web](https://developers.google.com/web)

# OFFLINE SUPPORT

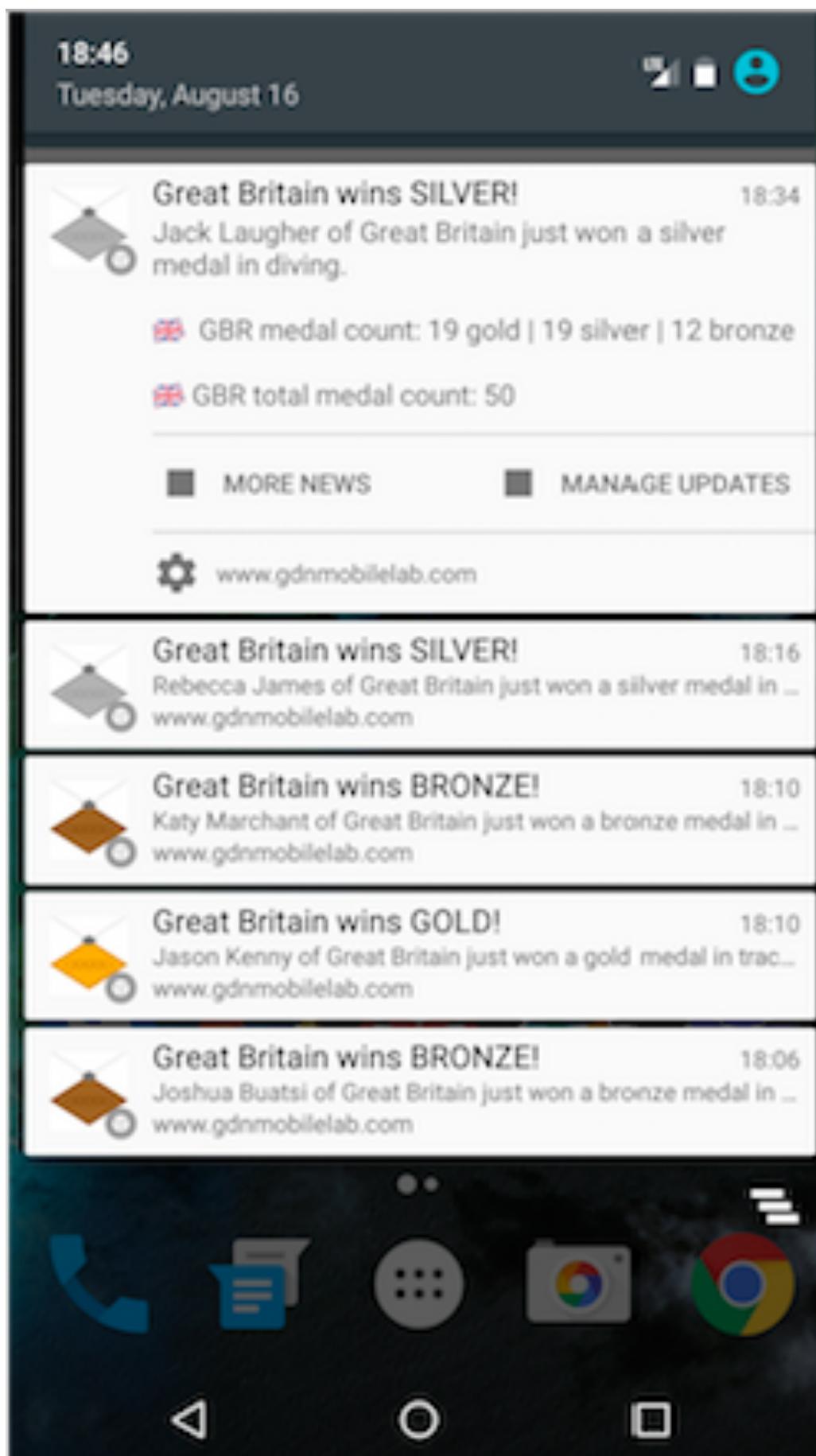
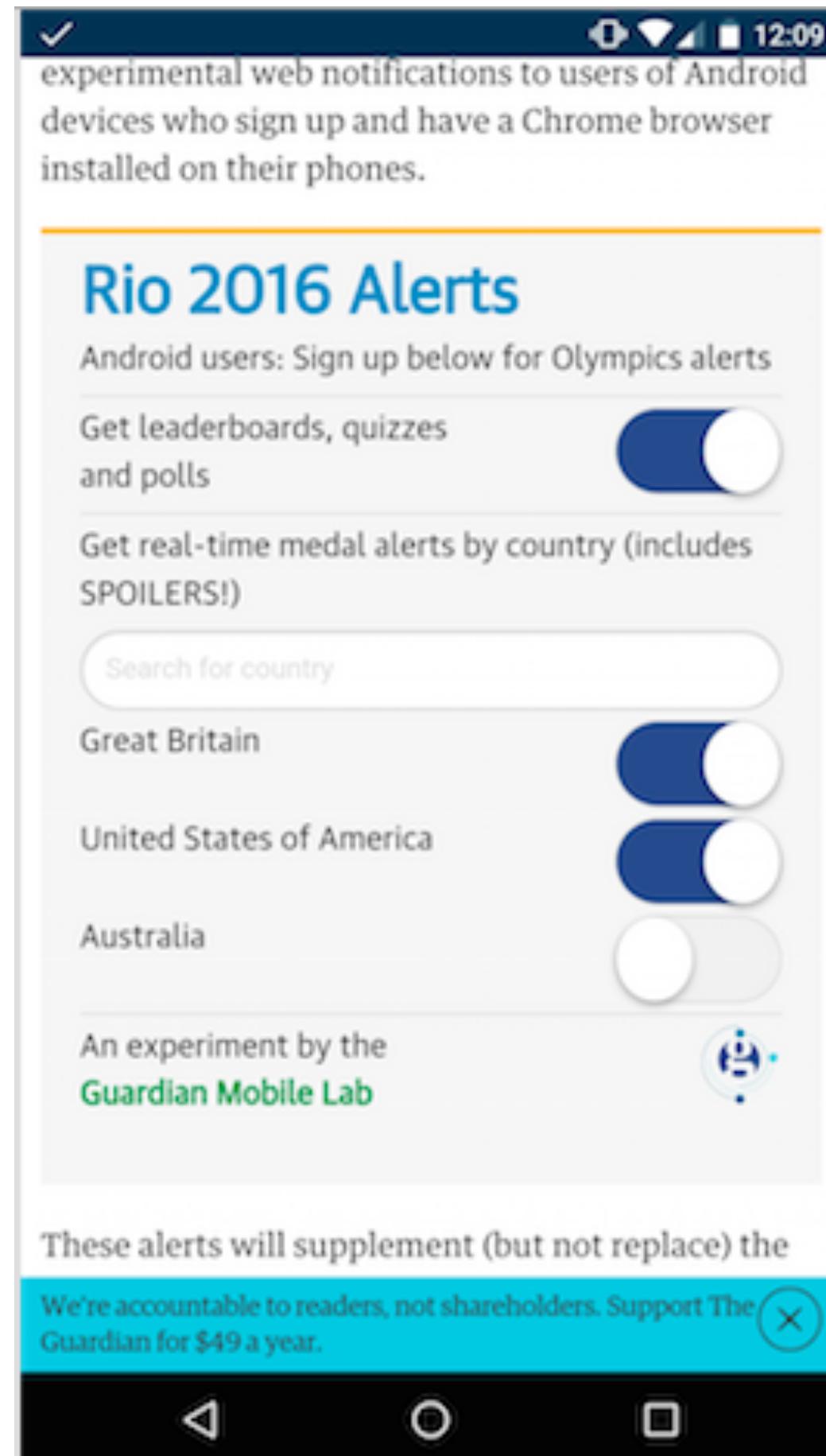


[developers.google.com/web](https://developers.google.com/web)

# OFFLINE SUPPORT



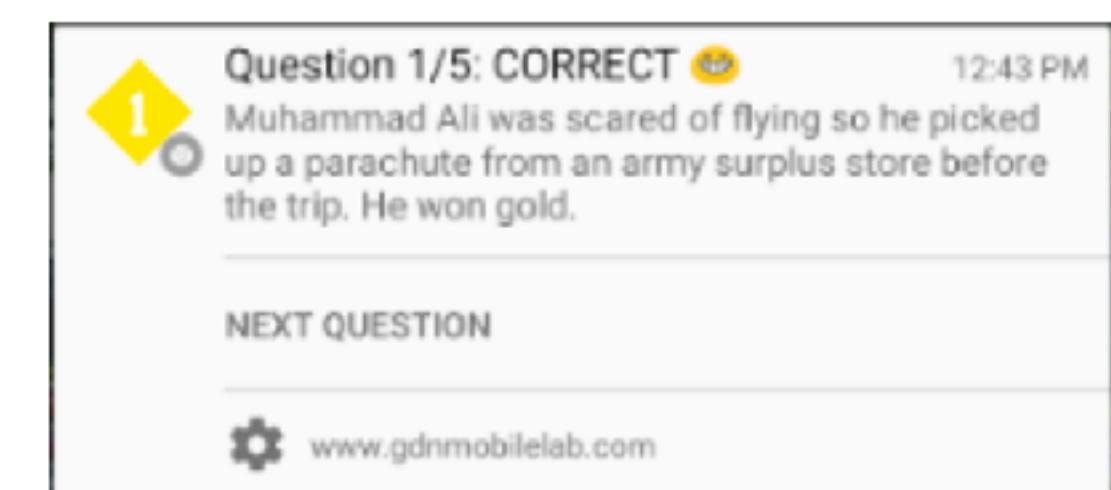
# PUSH NOTIFICATIONS



Users tapped the action button to start the quiz

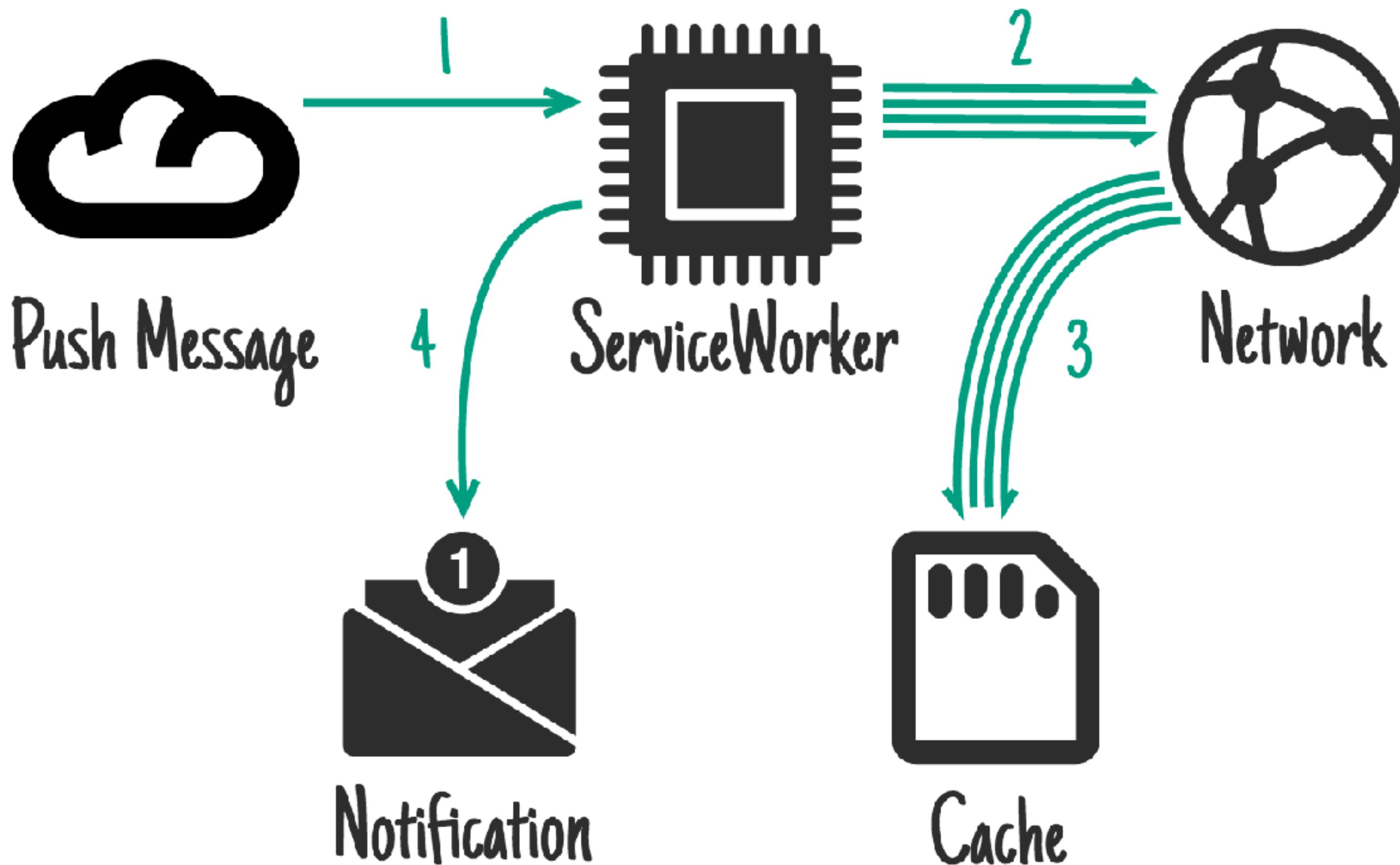


Users tapped on the action button with their answer

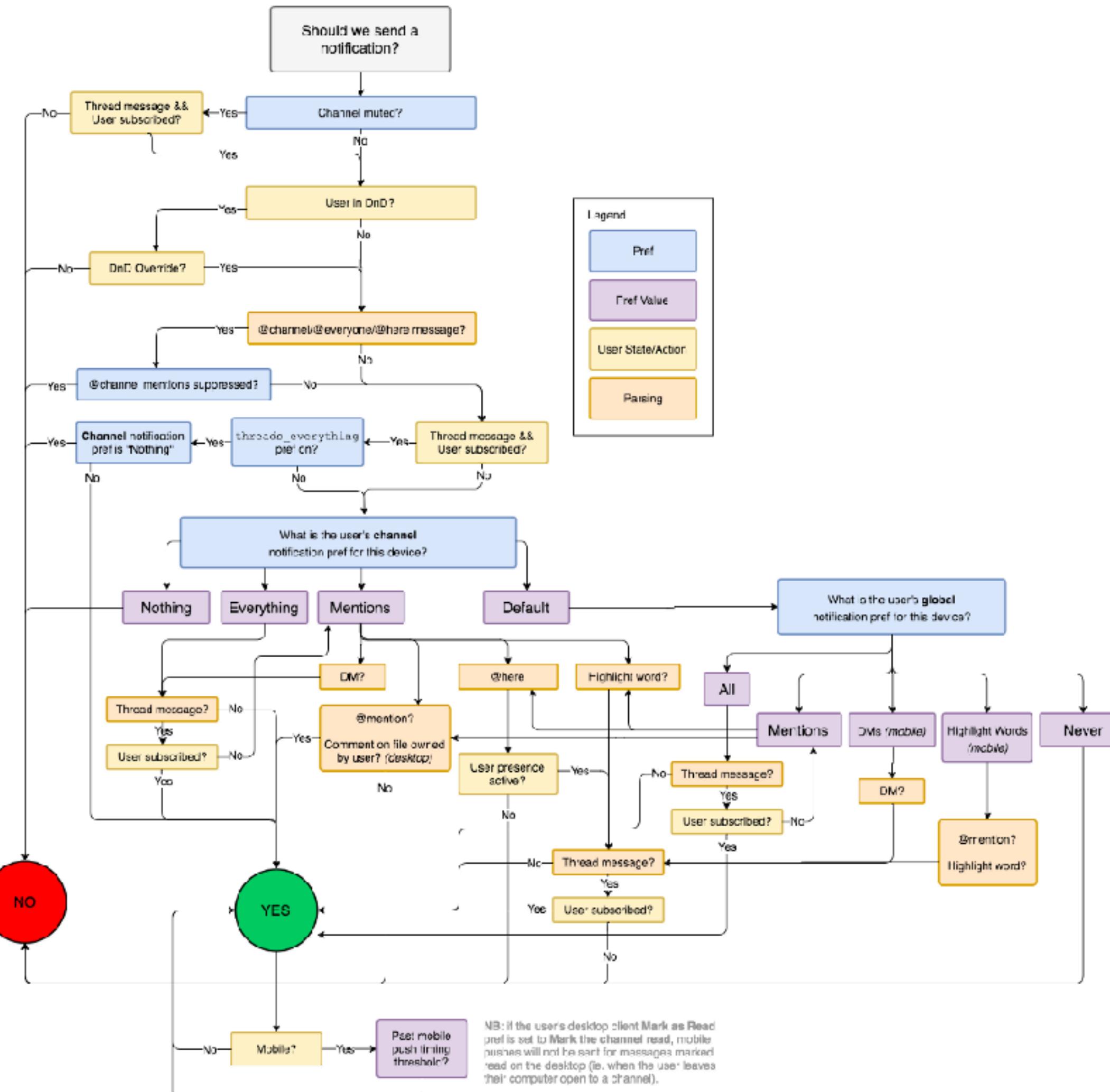


The answer was revealed before going to the next question

# PUSH NOTIFICATIONS



# PUSH NOTIFICATIONS



[slack.engineering/reducing-slacks-memory-footprint-4480fec7e8eb](https://slack.engineering/reducing-slacks-memory-footprint-4480fec7e8eb)

# 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	304	Not Mod...	deanhume.github...	p...	Oth...	334 B	250 ms	234 ms	
	/Service-Workers...						342 KB			

You are currently online!

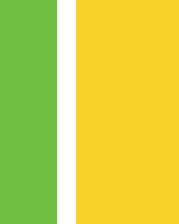
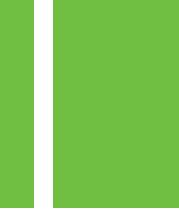
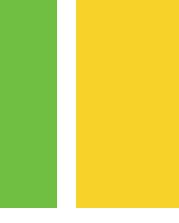
Click on the button below to make an HTTP request.

**HTTP Request is made**

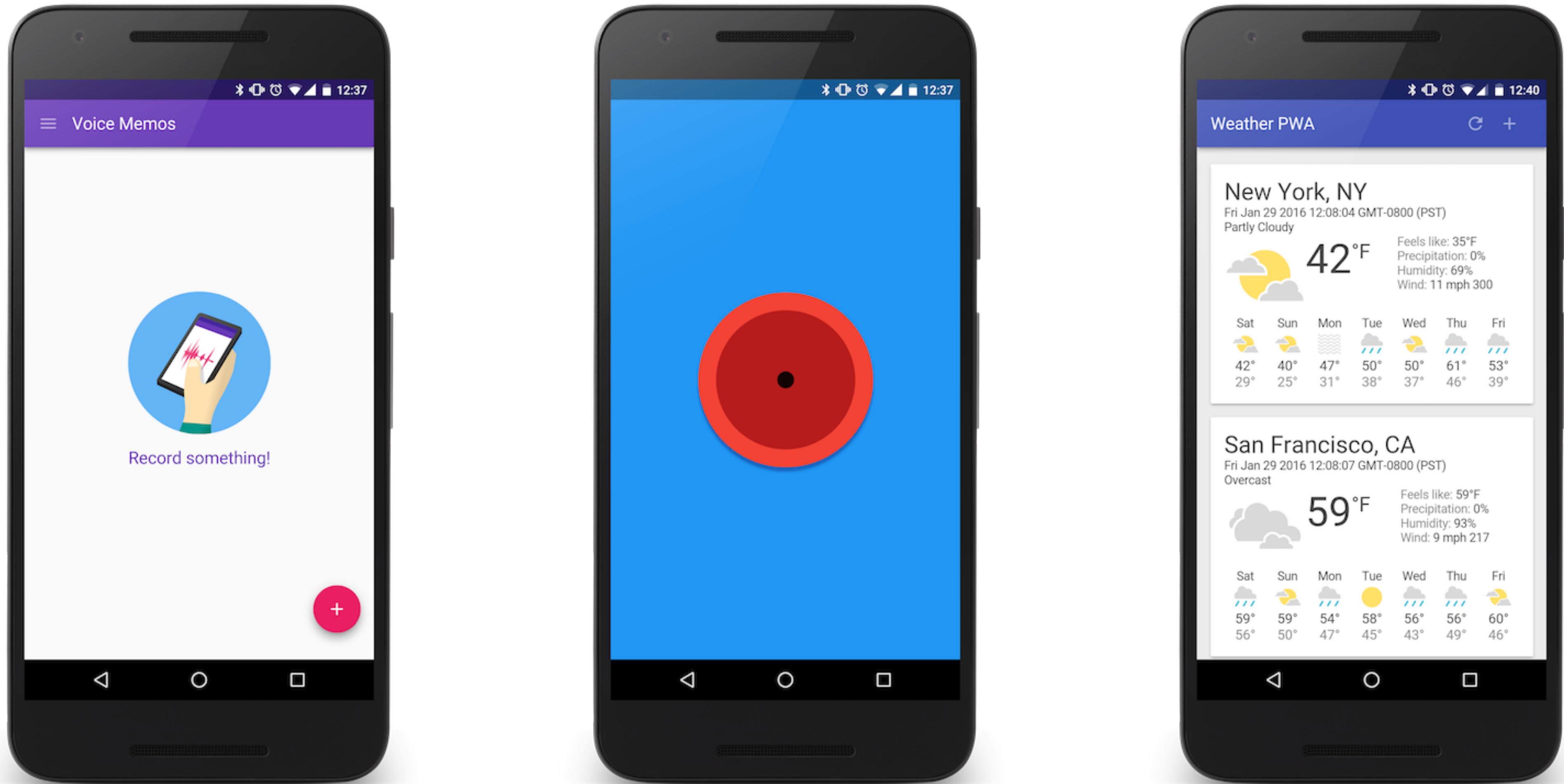
Make an HTTP request - do it!

Name	Path	Status	Text	Domain	Type	Initi...	Size	Time	Latency	Timeli...
	doge.png	304	Not Mod...	deanhume.github...	p...	Oth...	334 B	250 ms	234 ms	
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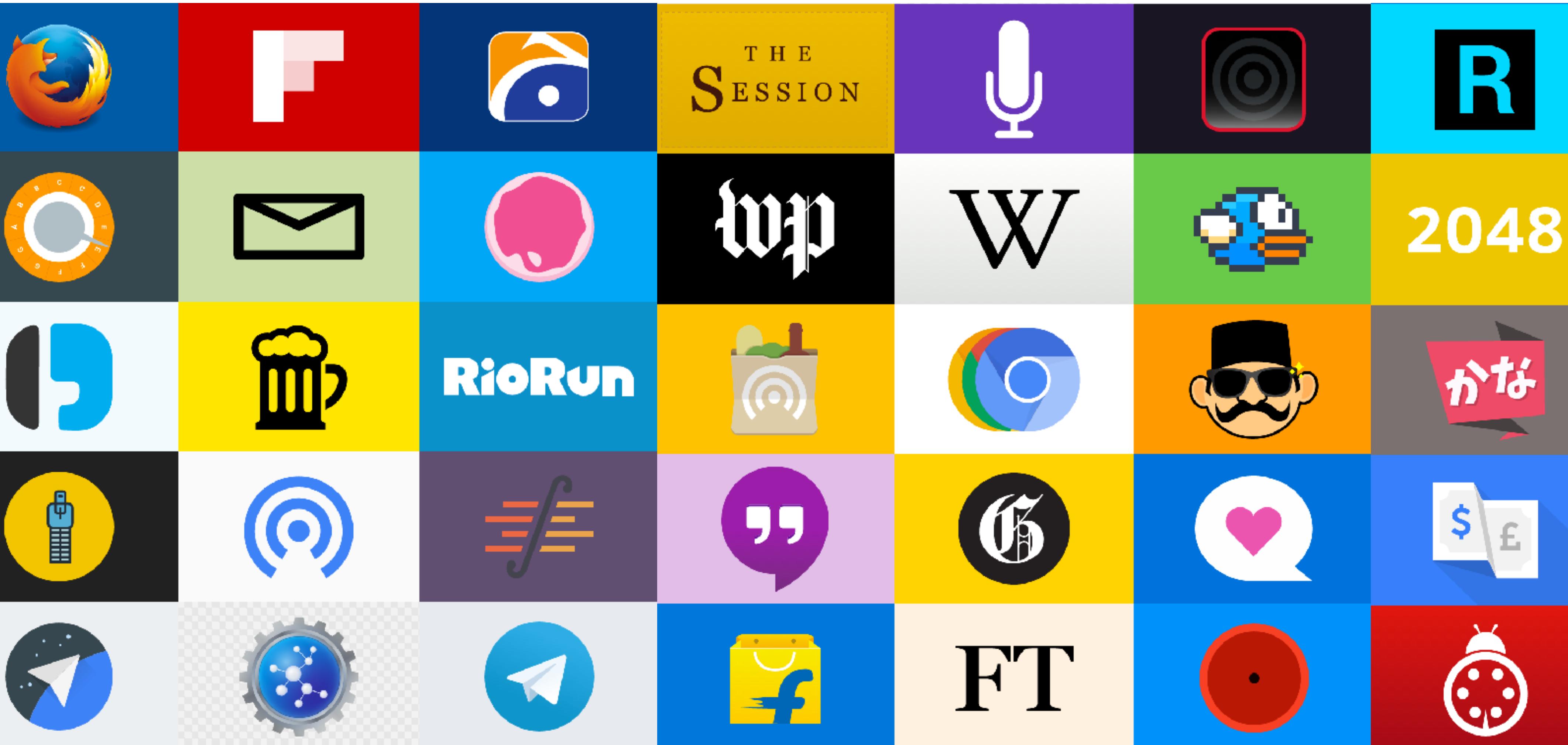
# BROWSER SUPPORT (2016-09)

	mobile			desktop		
						
homescreen & standalone					?	?
offline						?
push notifications						?
background sync			?	?	?	?
store	?	?	?	?		?

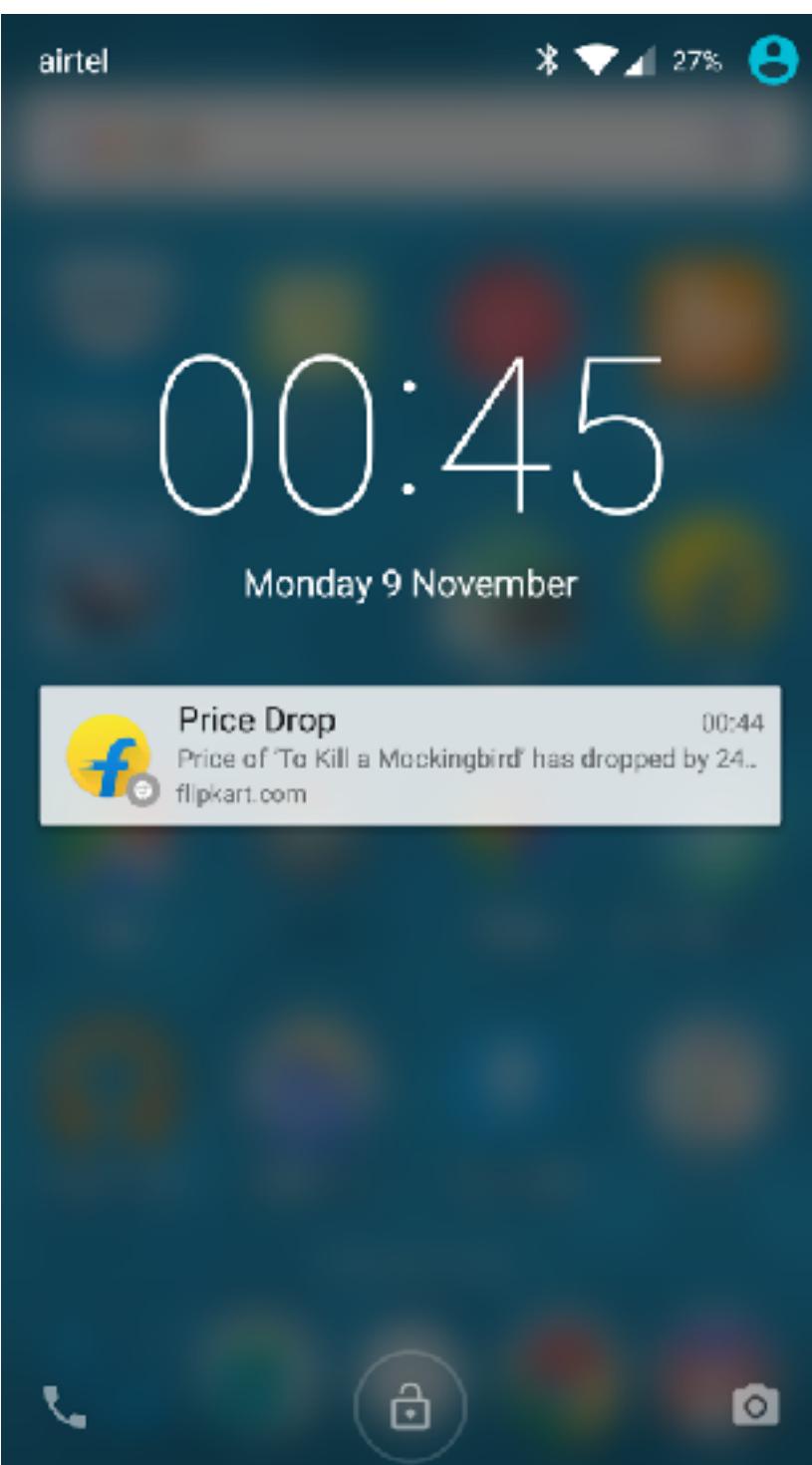
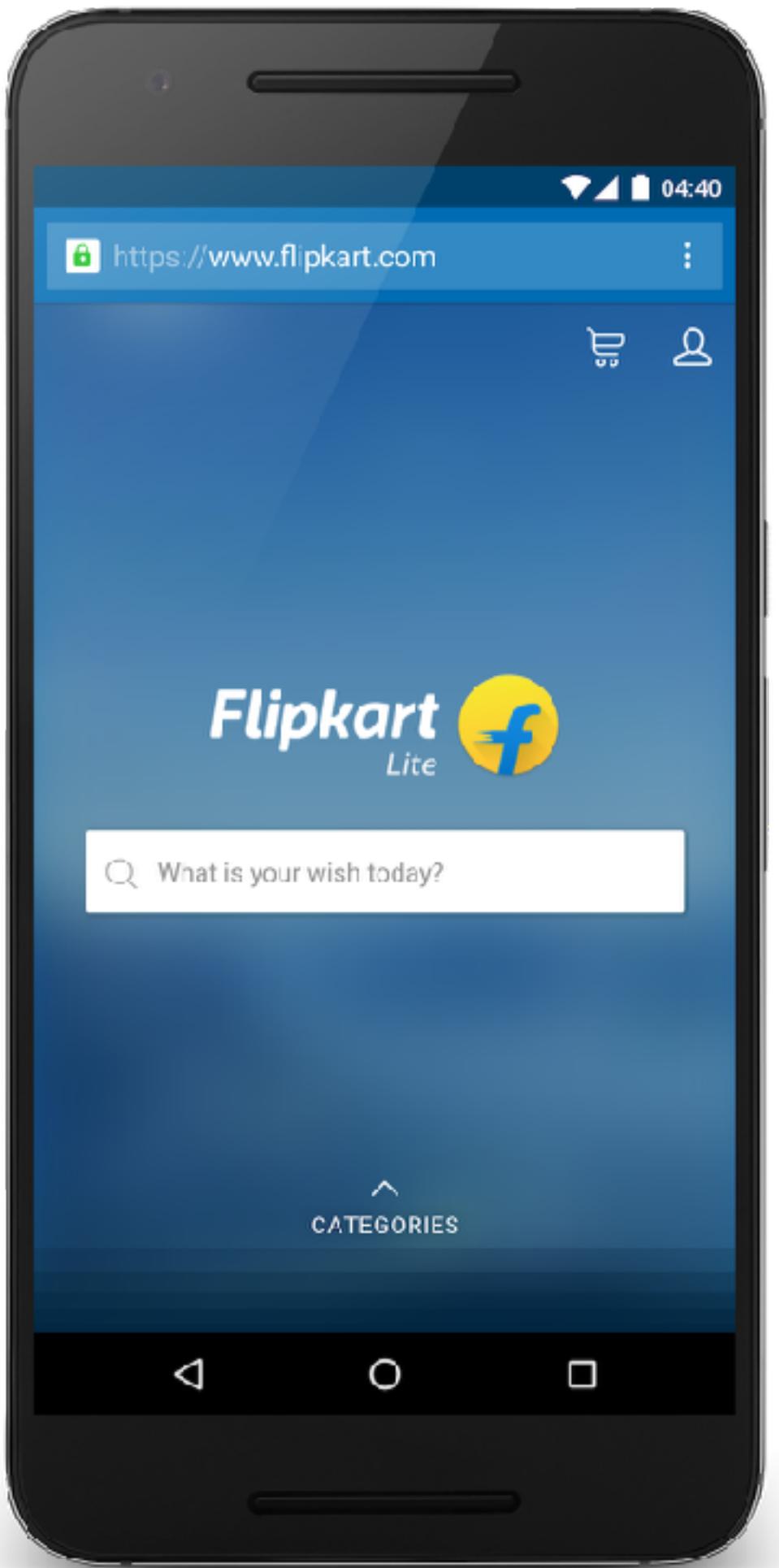
# PWA DEMOS



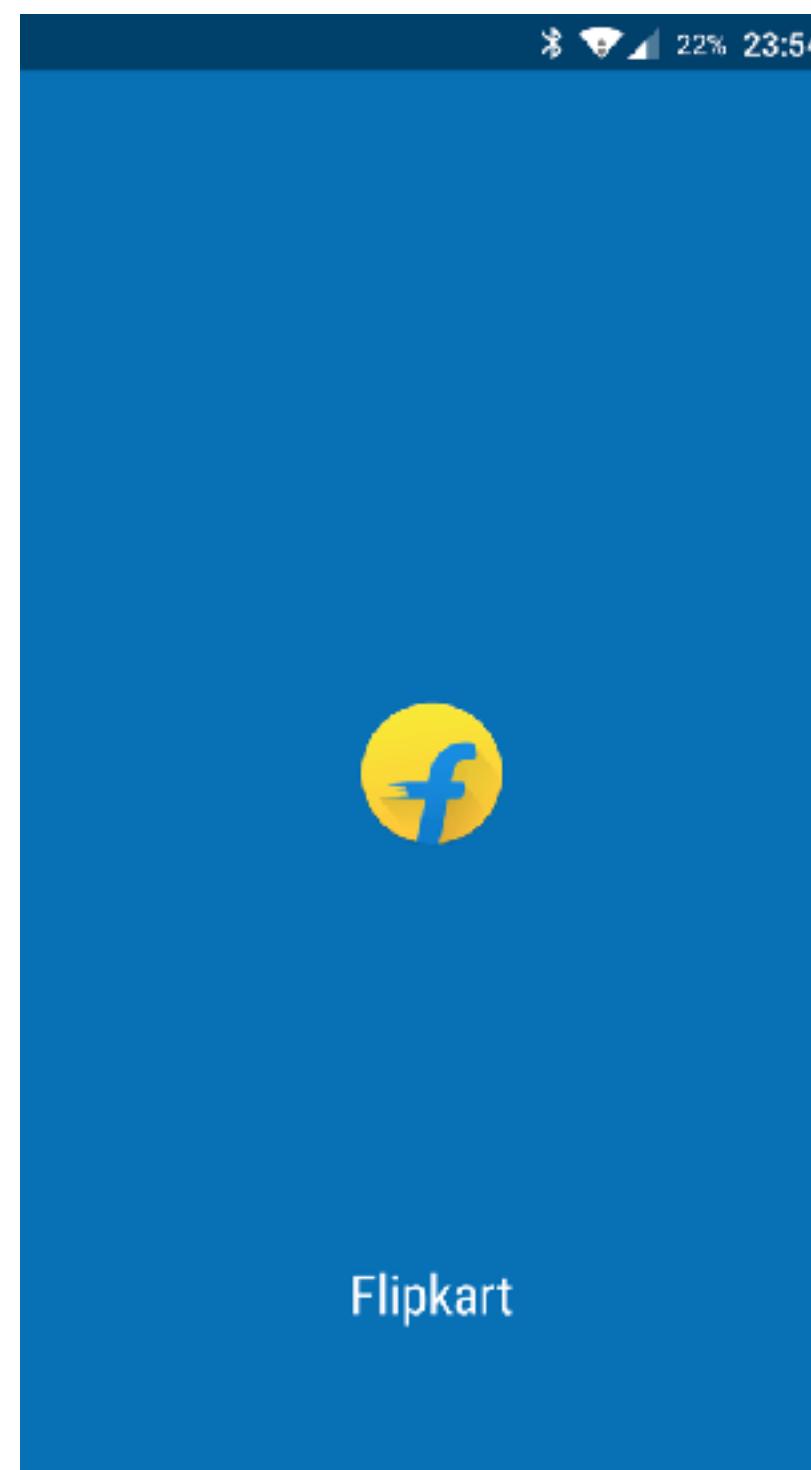
# MORE EXAMPLES



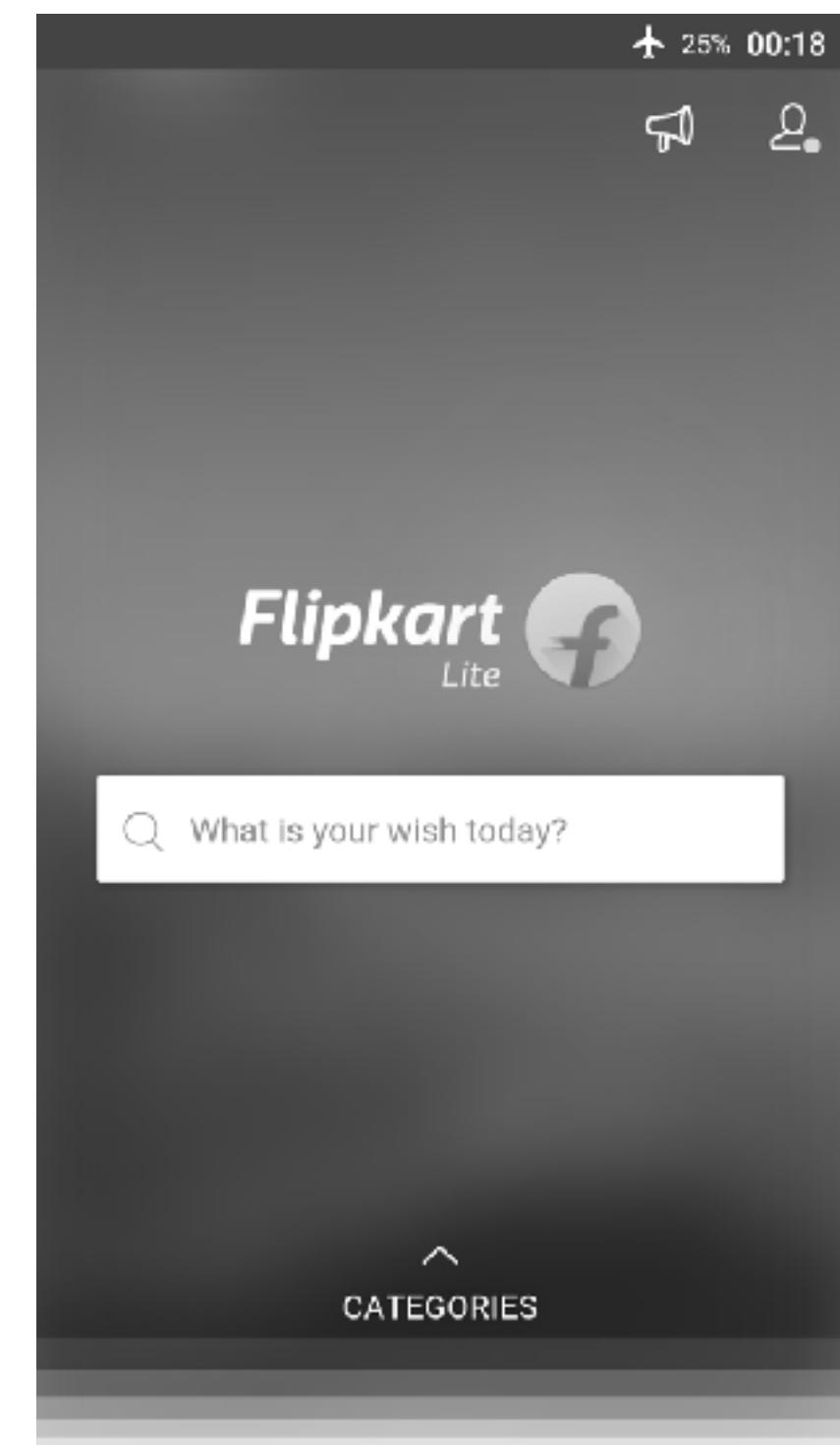
# EXAMPLE: FLIPKART LITE



notifications

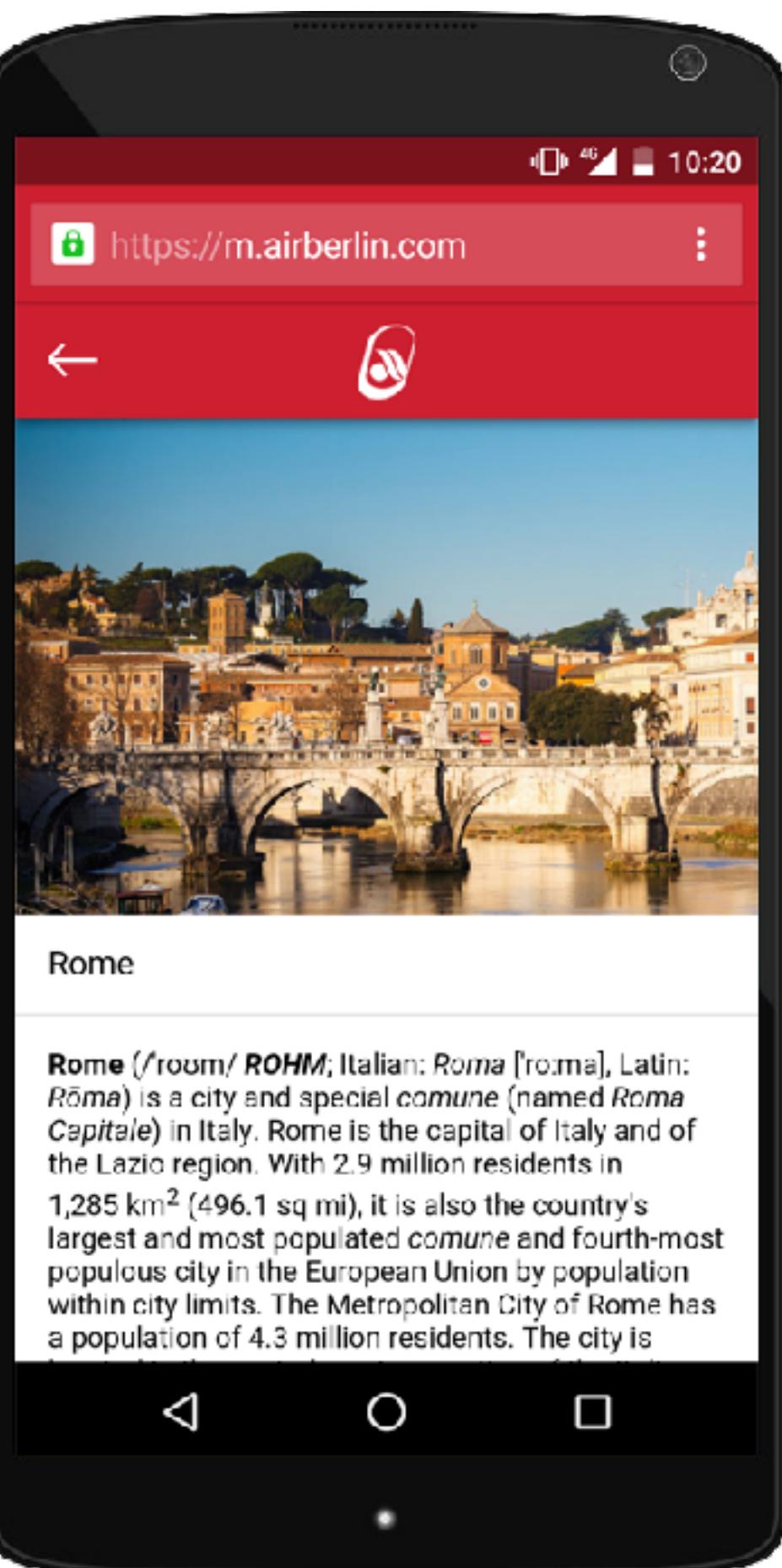
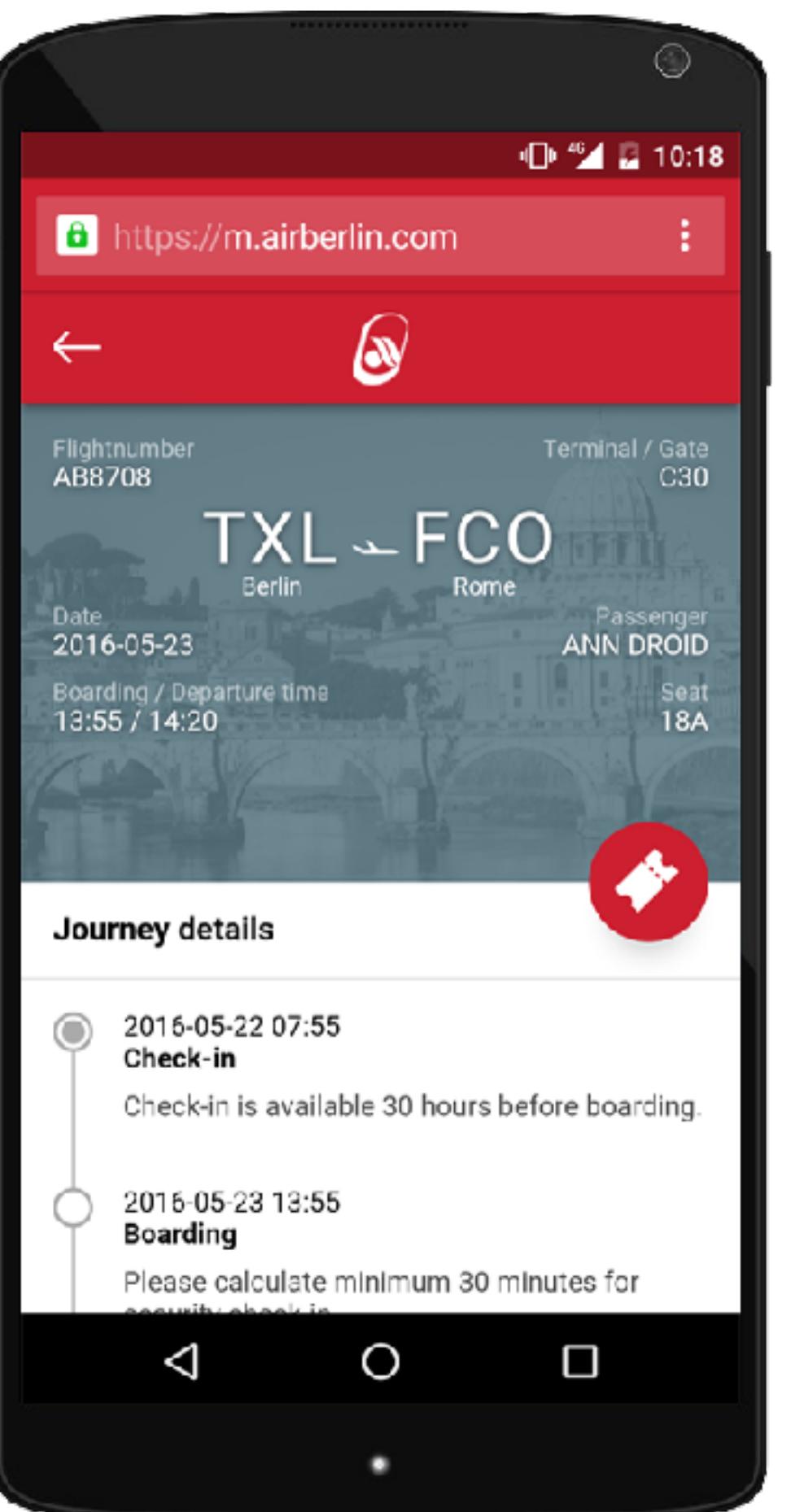
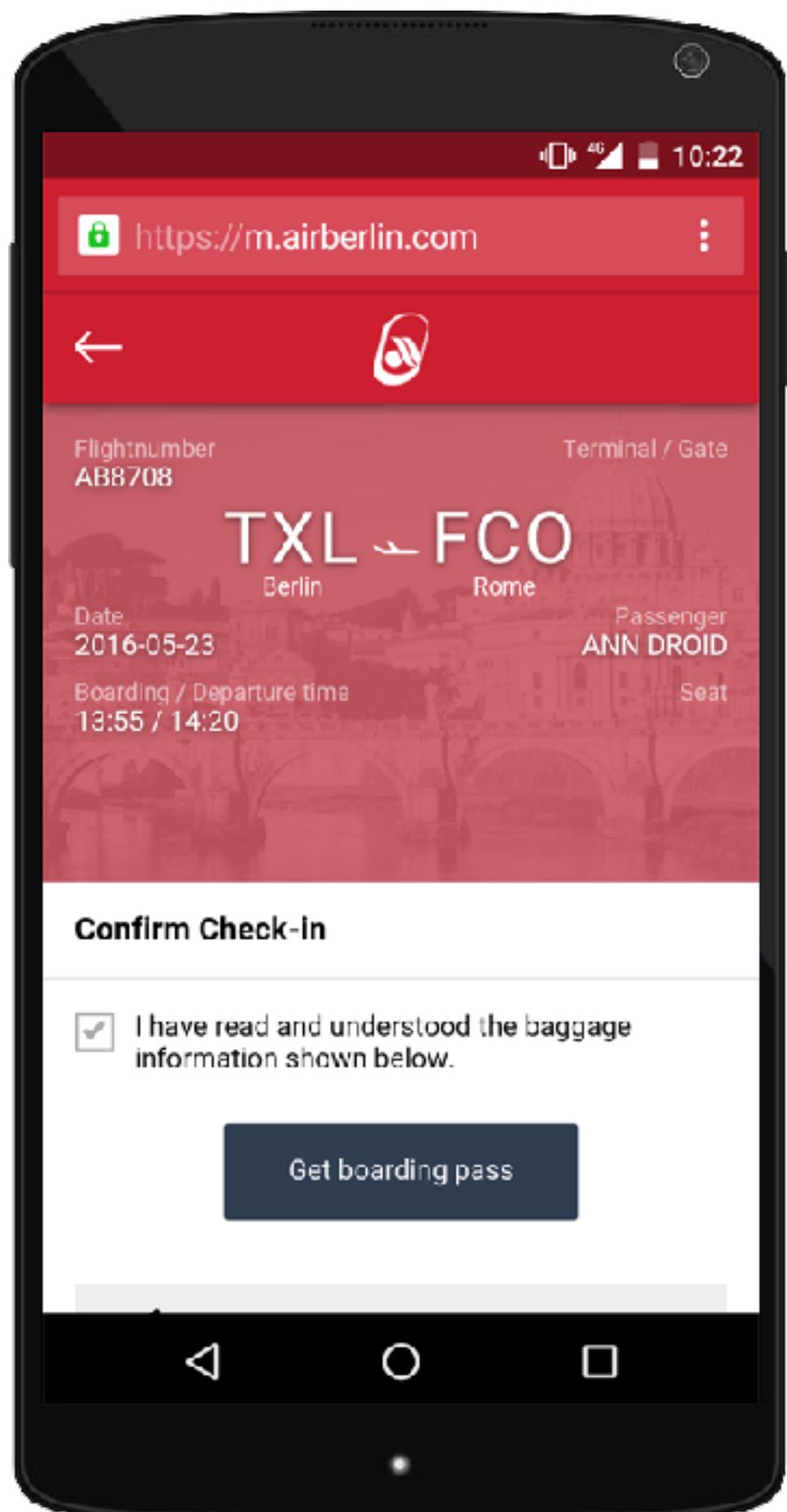


splash



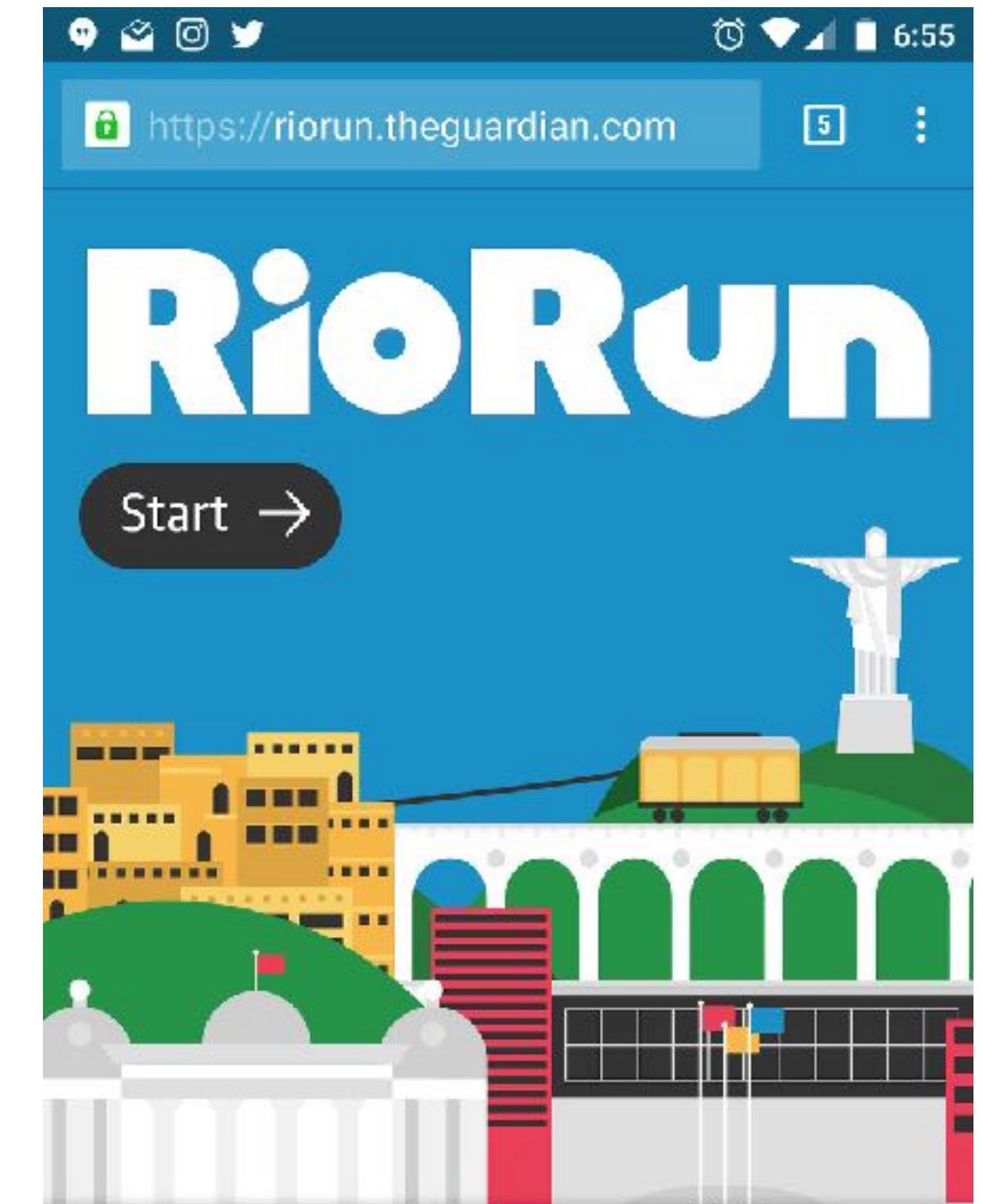
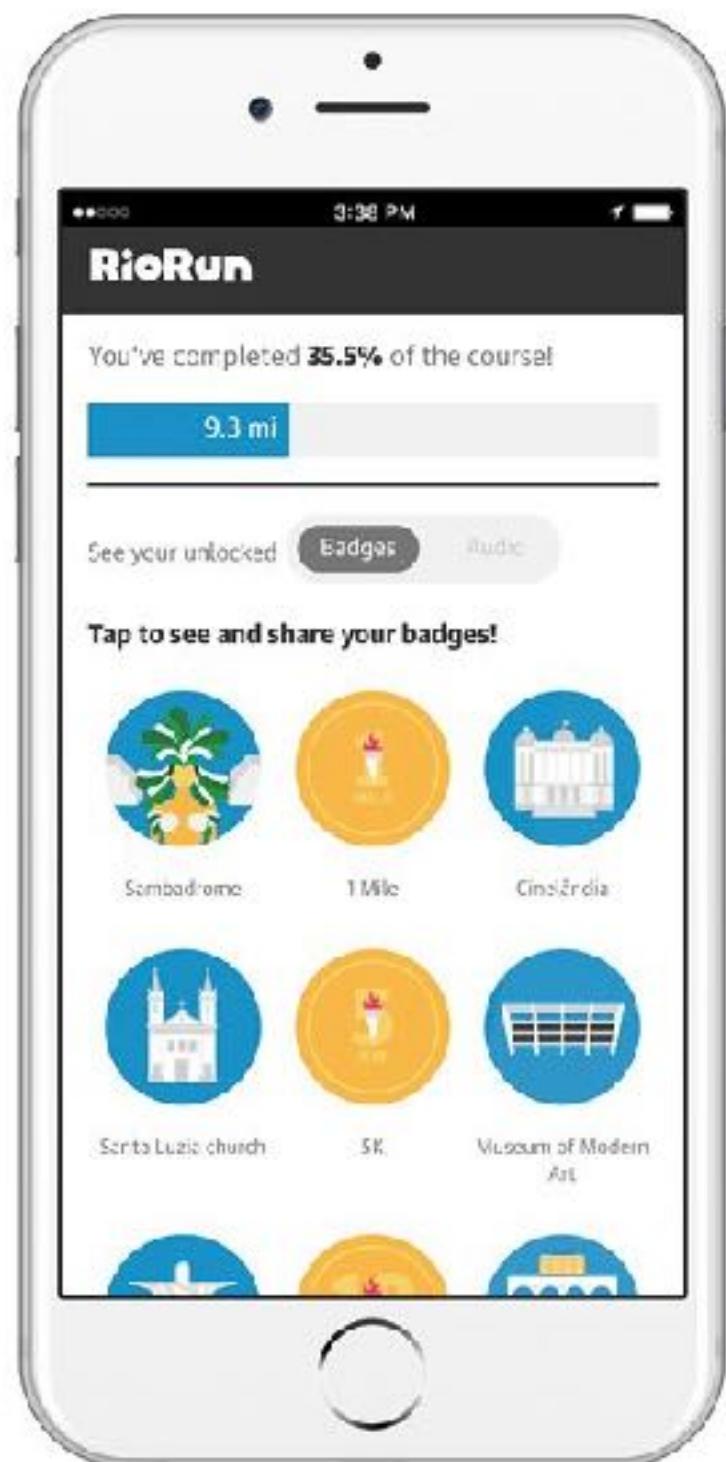
offline

# EXAMPLE: AIR BERLIN



[flights.airberlin.com/en-DE/progressive-web-app](https://flights.airberlin.com/en-DE/progressive-web-app)

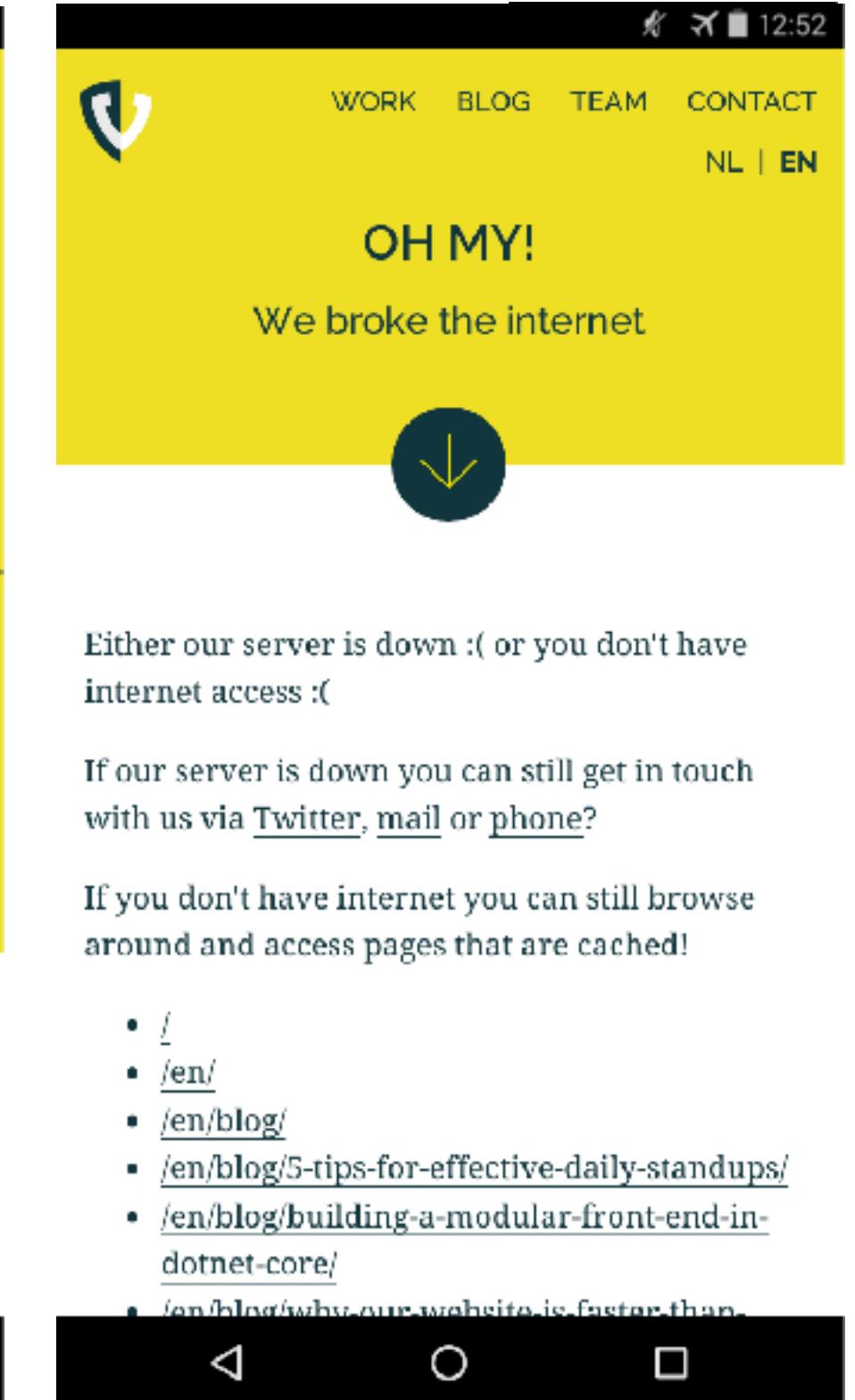
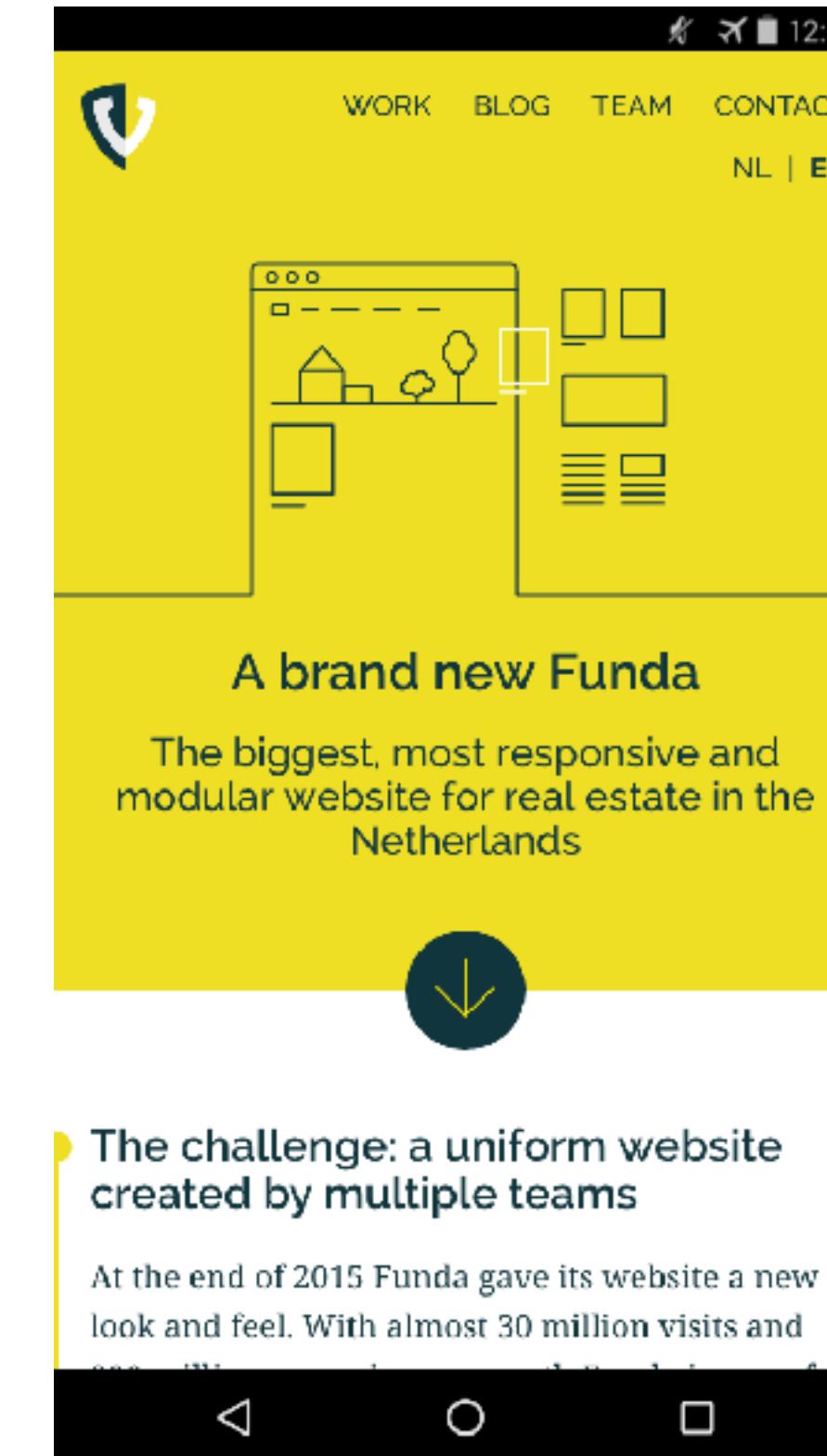
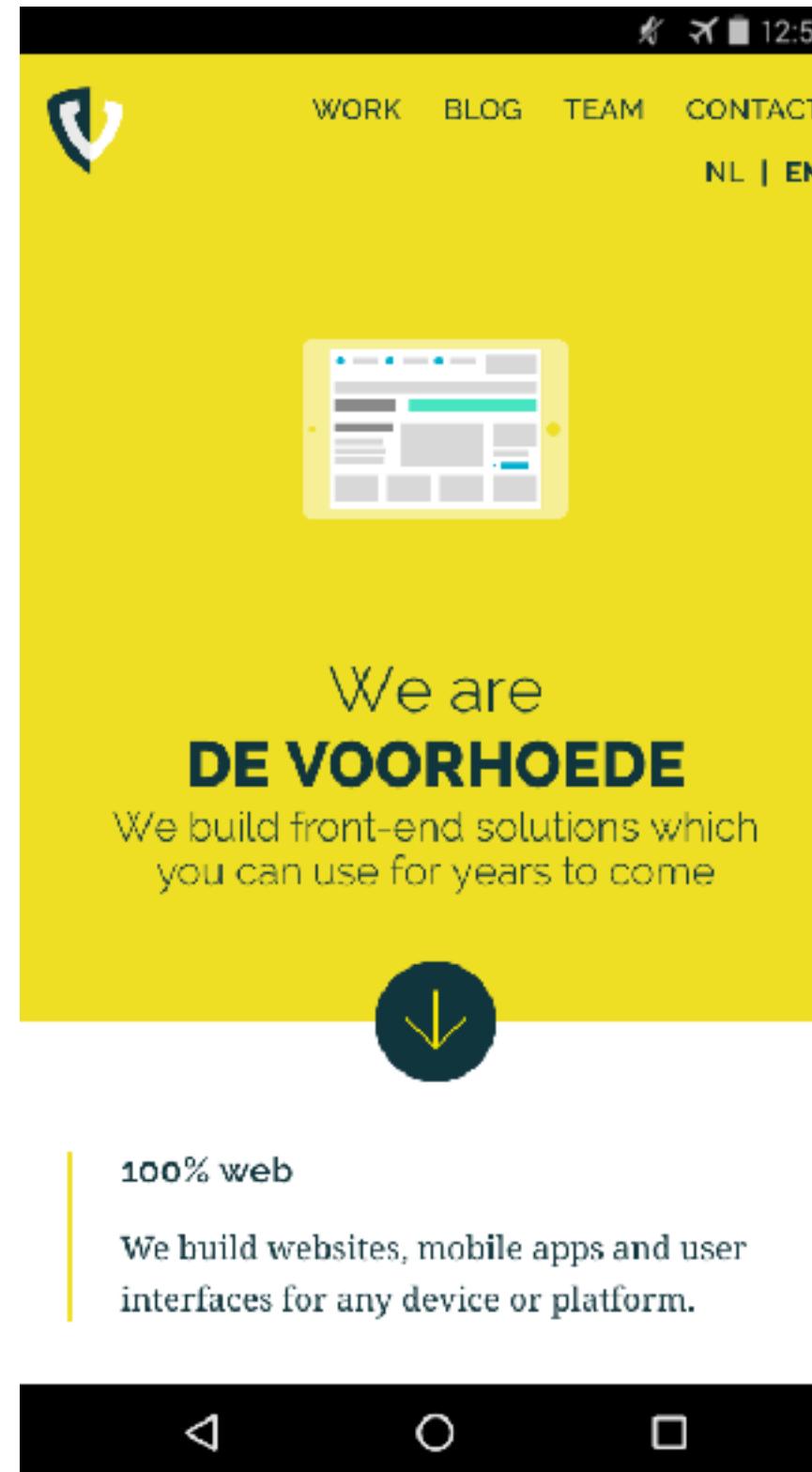
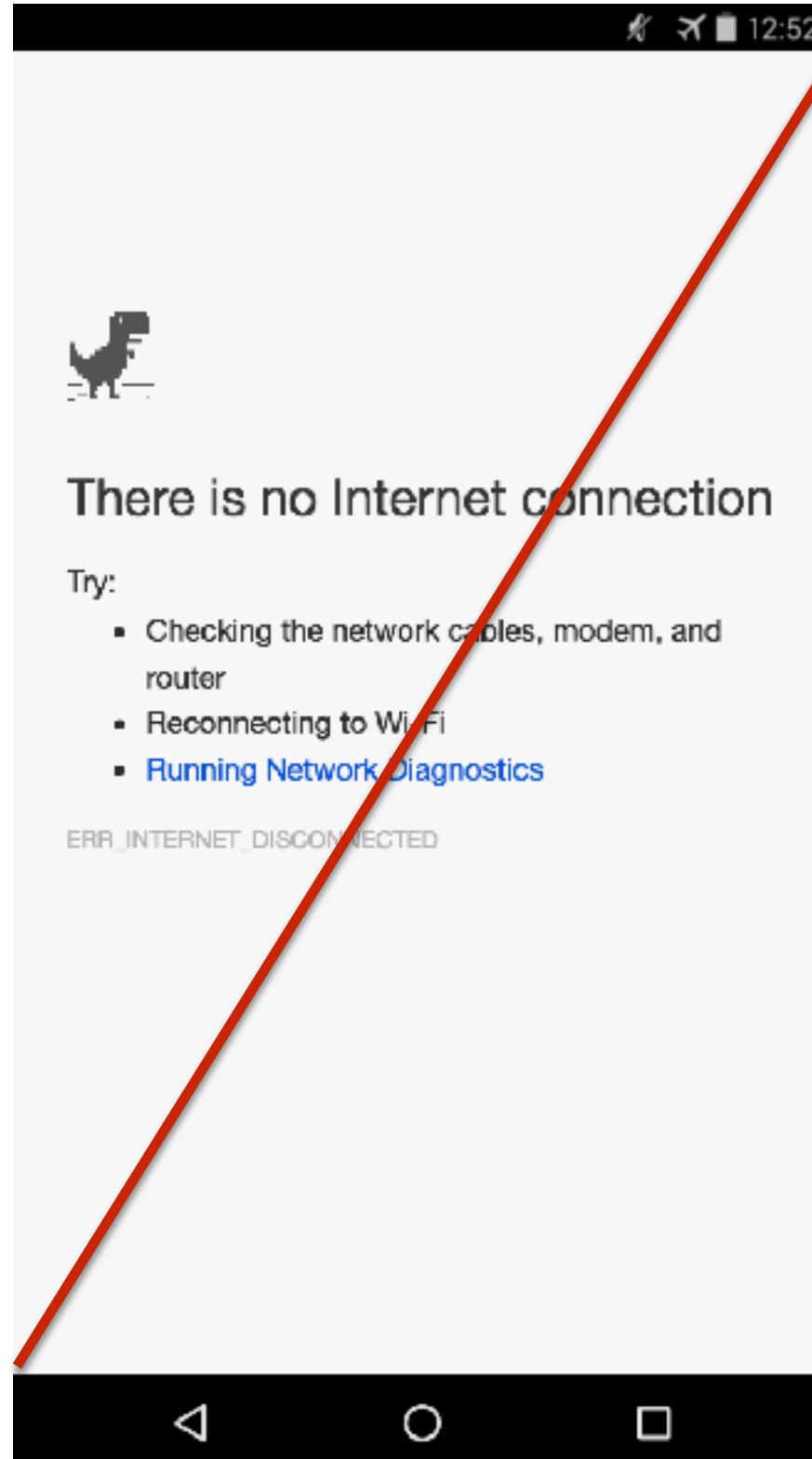
# EXAMPLE: RIO RUN



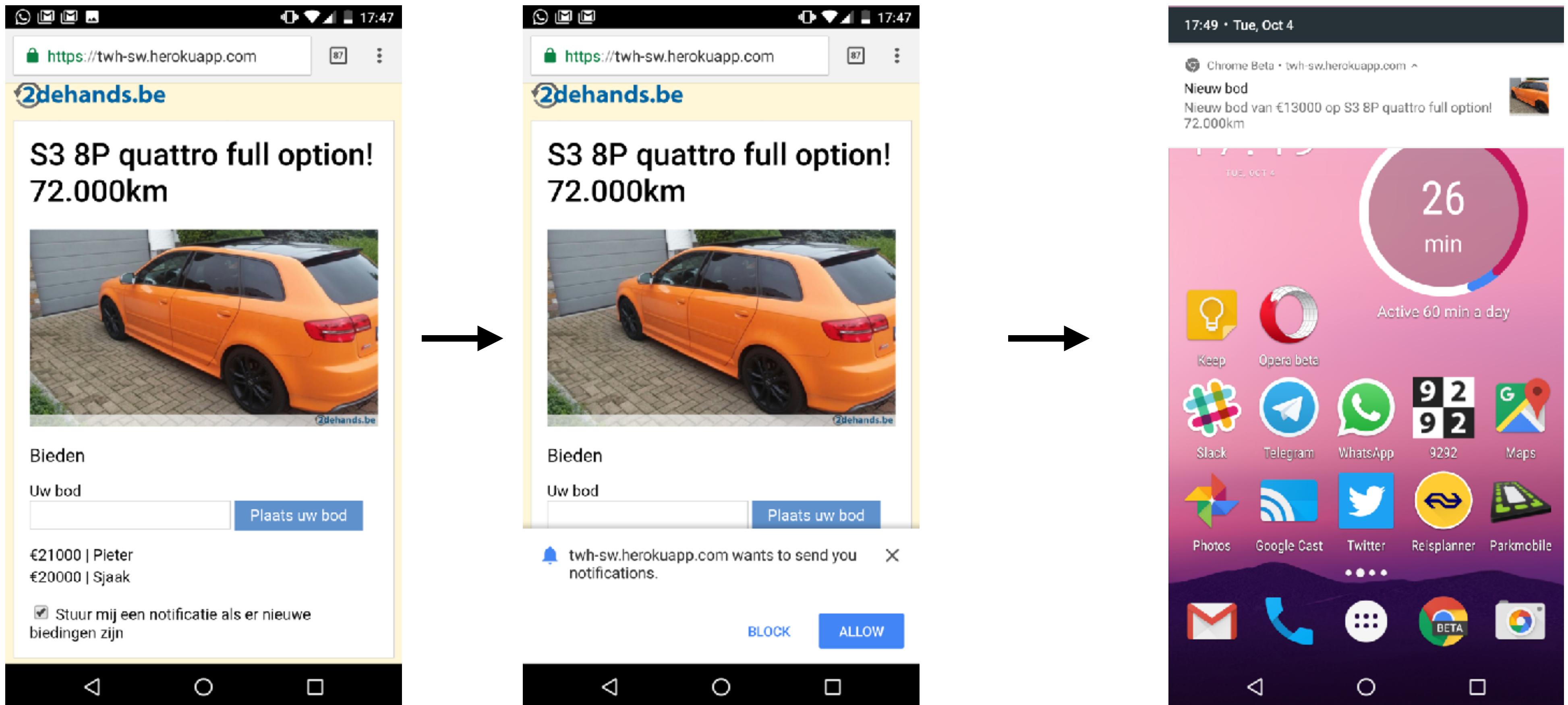
[theguardian.com/info/developer-blog/](http://theguardian.com/info/developer-blog/)

ADD TO HOME SCREEN

# EXAMPLE: VOORHOEDE.NL



# EXAMPLE: 2DEHANDS.BE POC



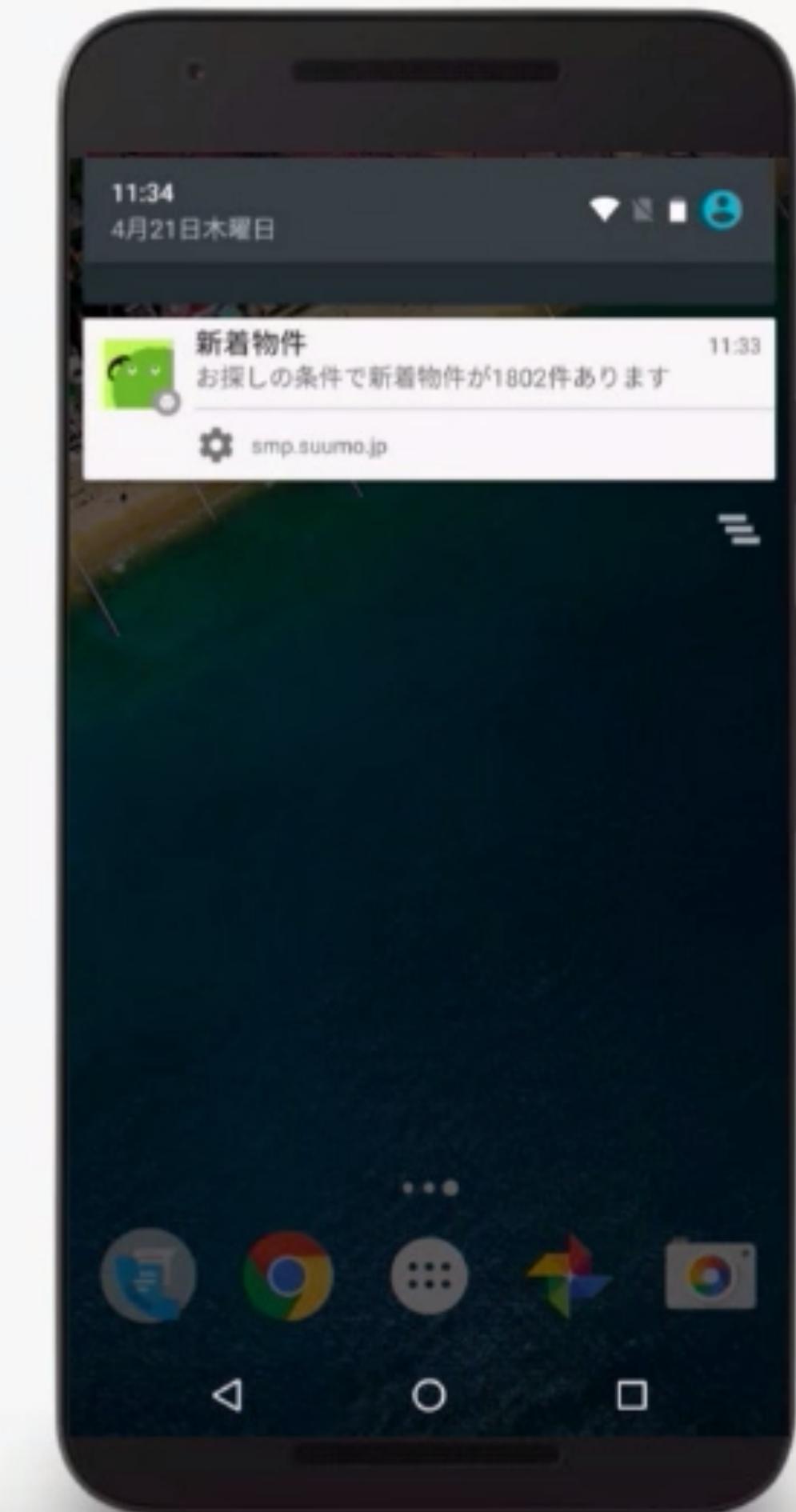
[twh-sw.herokuapp.com](https://twh-sw.herokuapp.com)

# 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=oSSl8liELJU&t=32m41s](https://youtube.com/watch?v=oSSl8liELJU&t=32m41s)

# RETENTION ↑

selioapp.com

AVERAGE SESSION

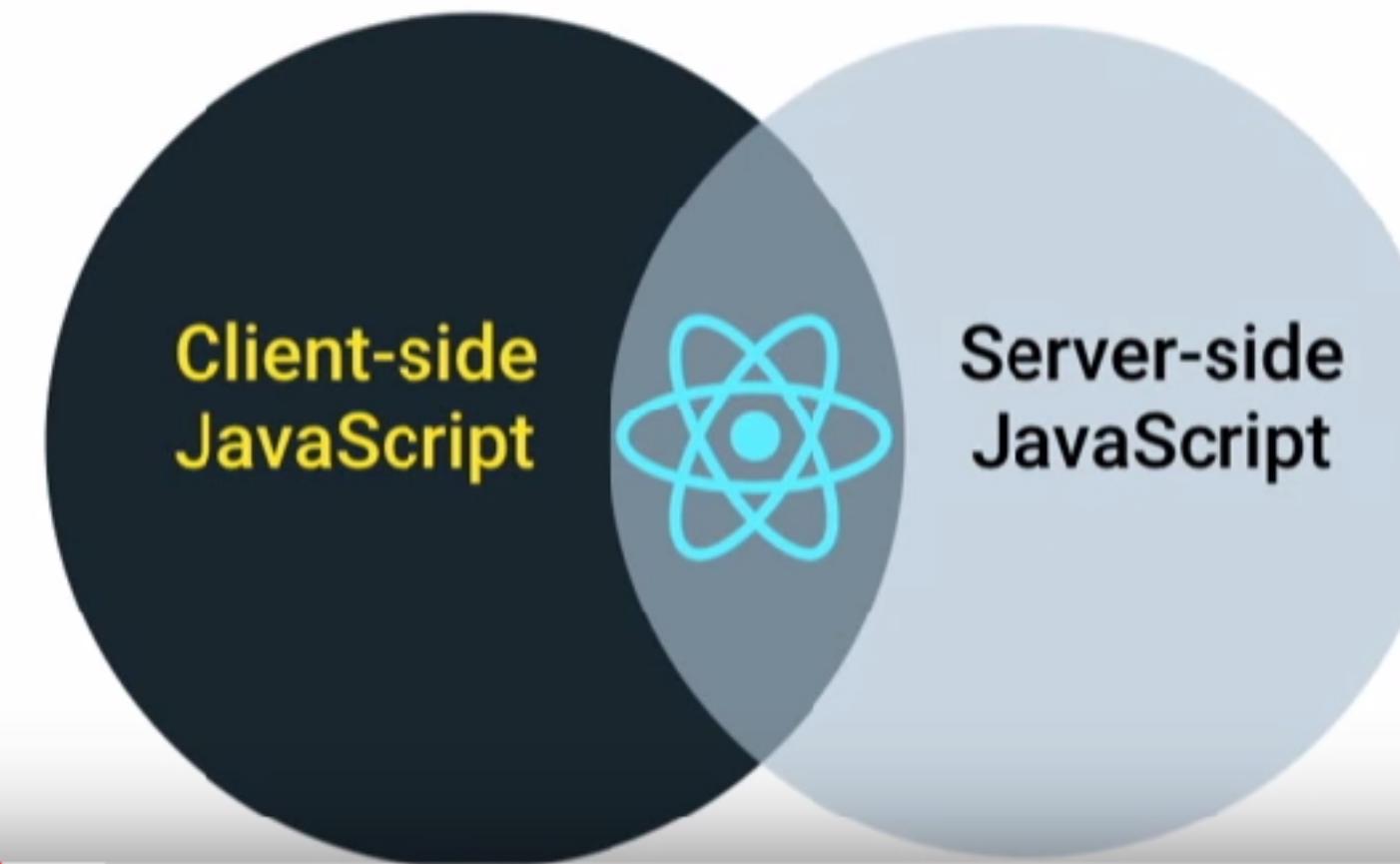
6+

minutes

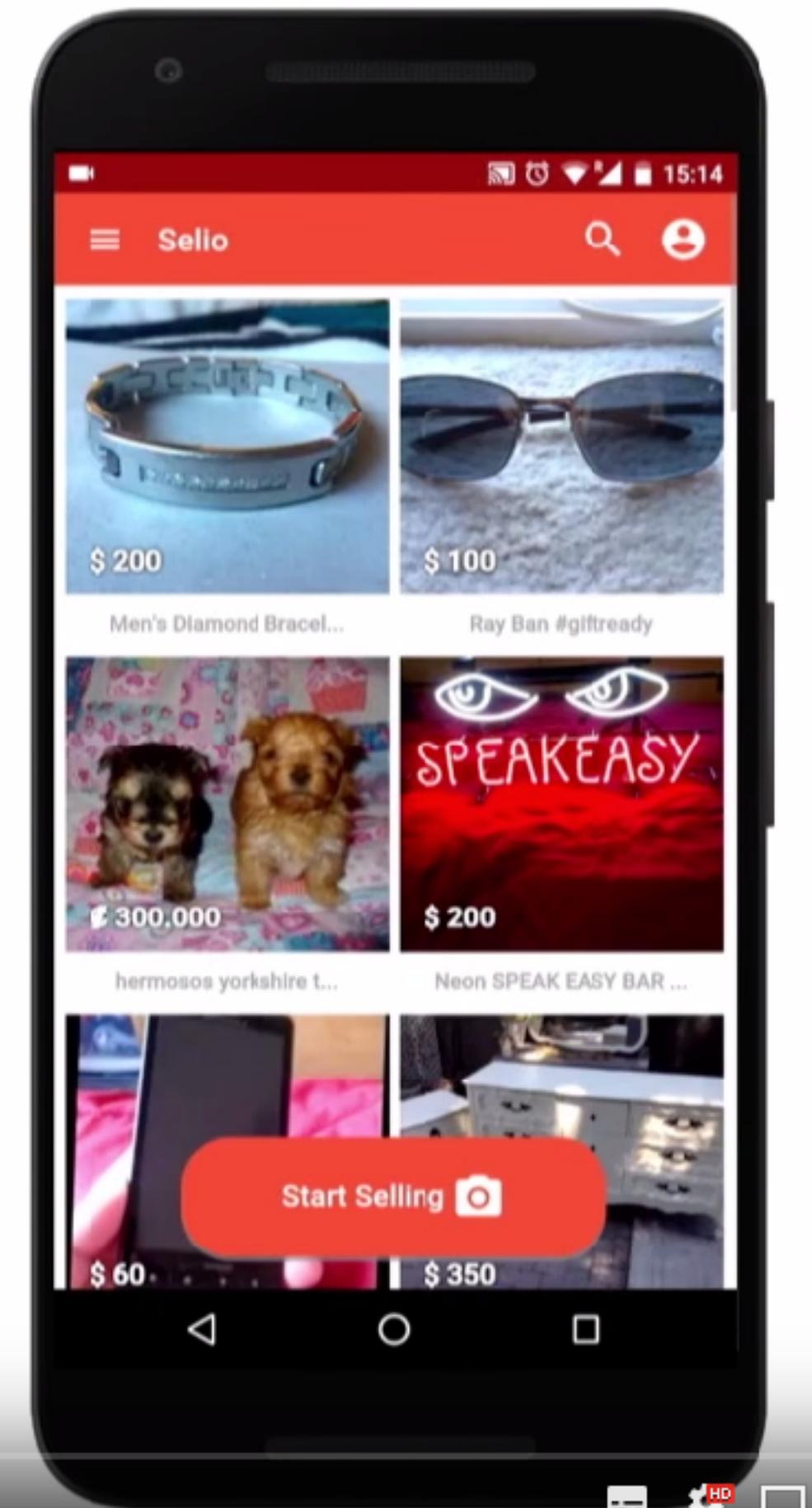
USER ACQUISITION

10X

cheaper than native



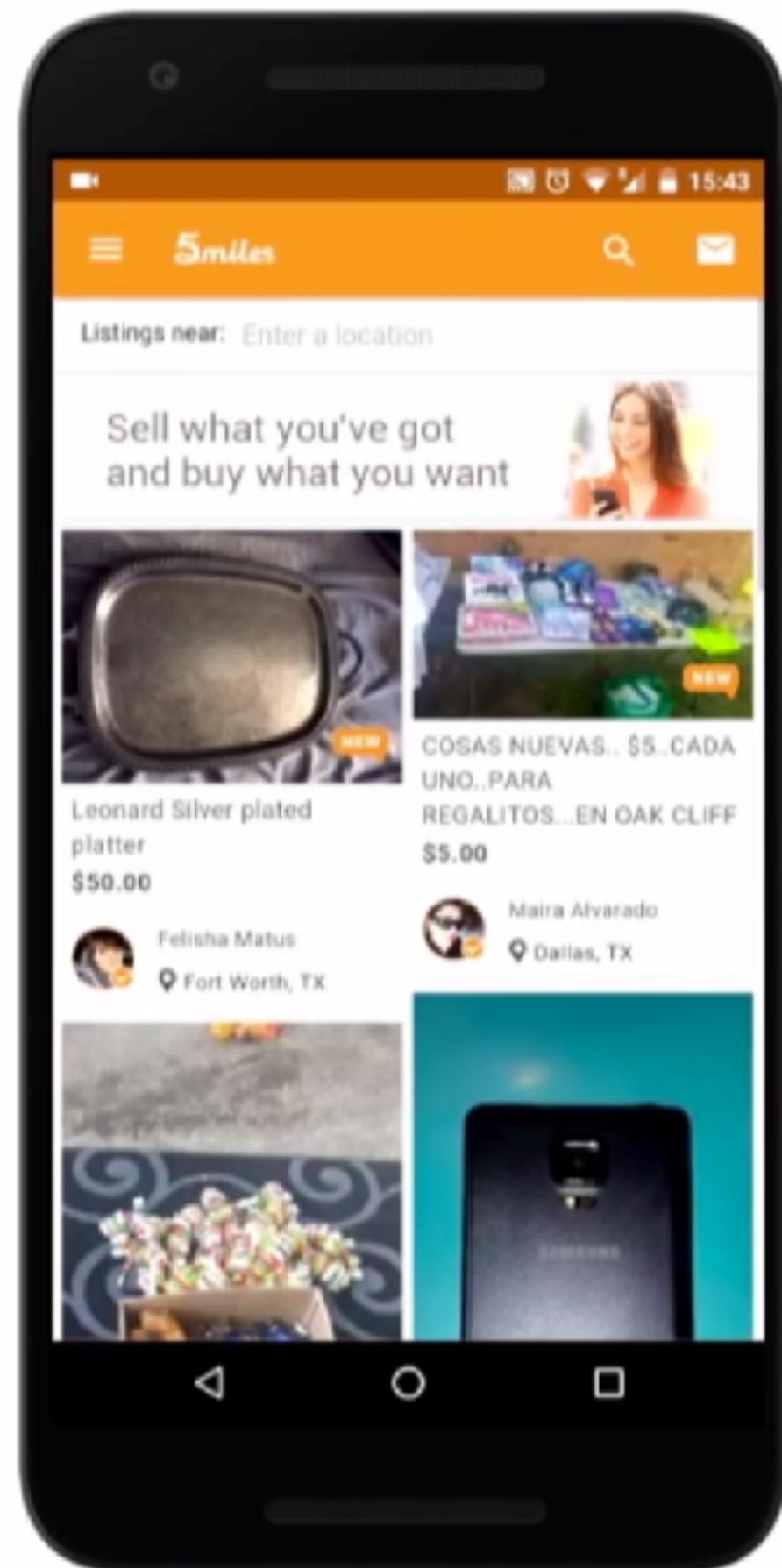
3:46 / 43:08



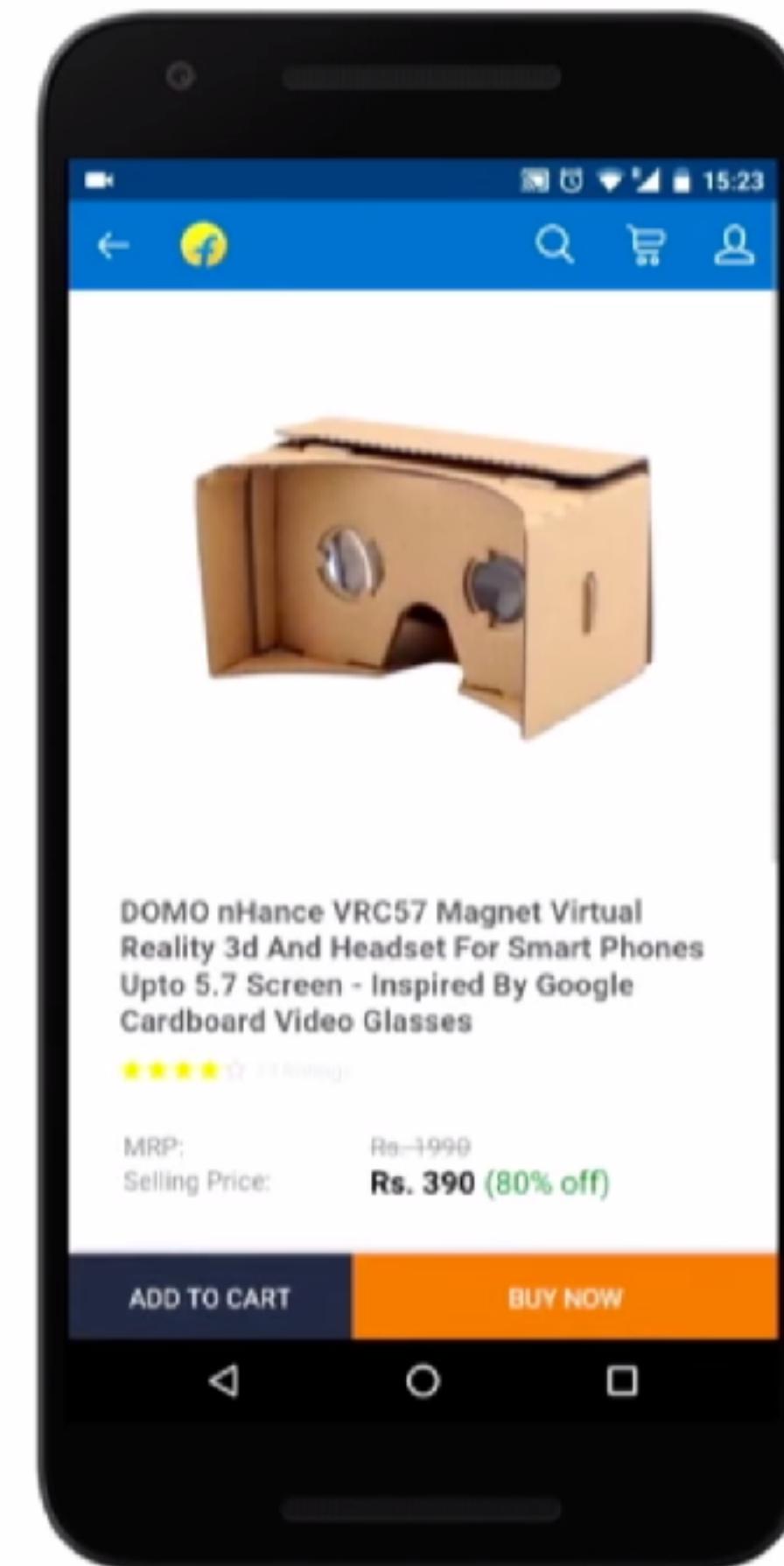
[www.youtube.com/watch?v=srdKqoDckXQ&t=3m40s](https://www.youtube.com/watch?v=srdKqoDckXQ&t=3m40s)

# CONVERSION ↑

A2HS USERS HAD  
**30%**  
BETTER CONVERSIONS

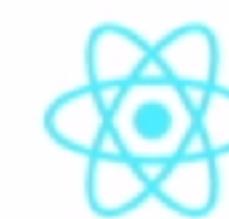


5miles



FlipKart

A2HS USERS HAD  
**70%**  
BETTER CONVERSIONS



React

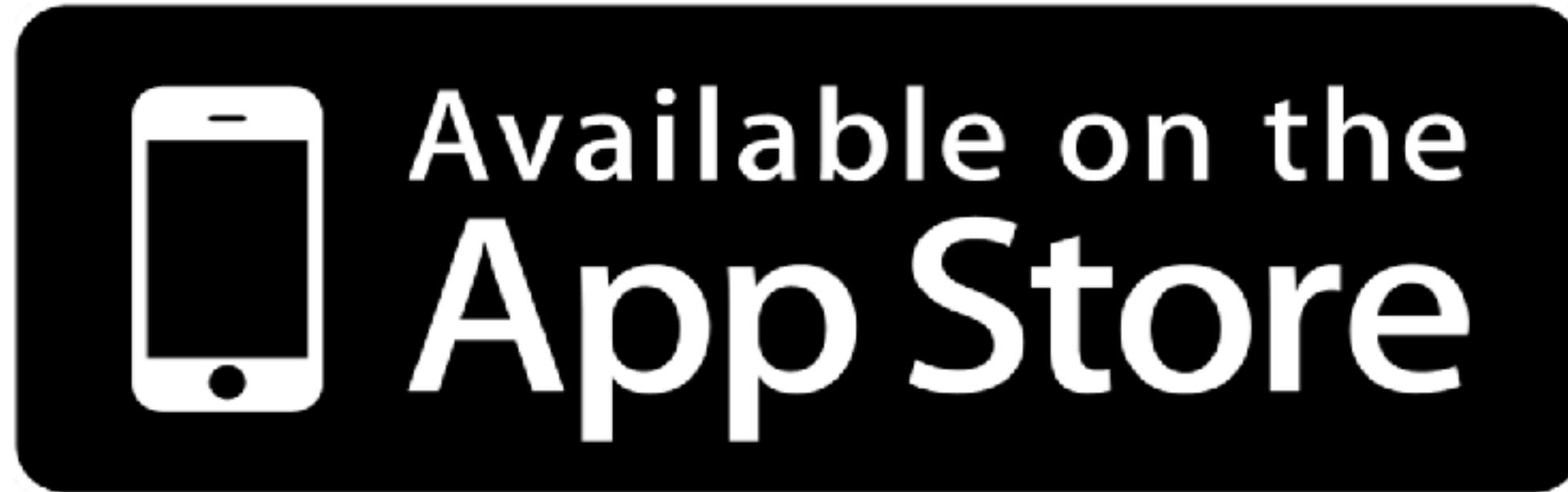


[youtube.com/watch?v=srdKqoDckXQ&t=3m](https://youtube.com/watch?v=srdKqoDckXQ&t=3m)

# MORE APP UX PATTERNS

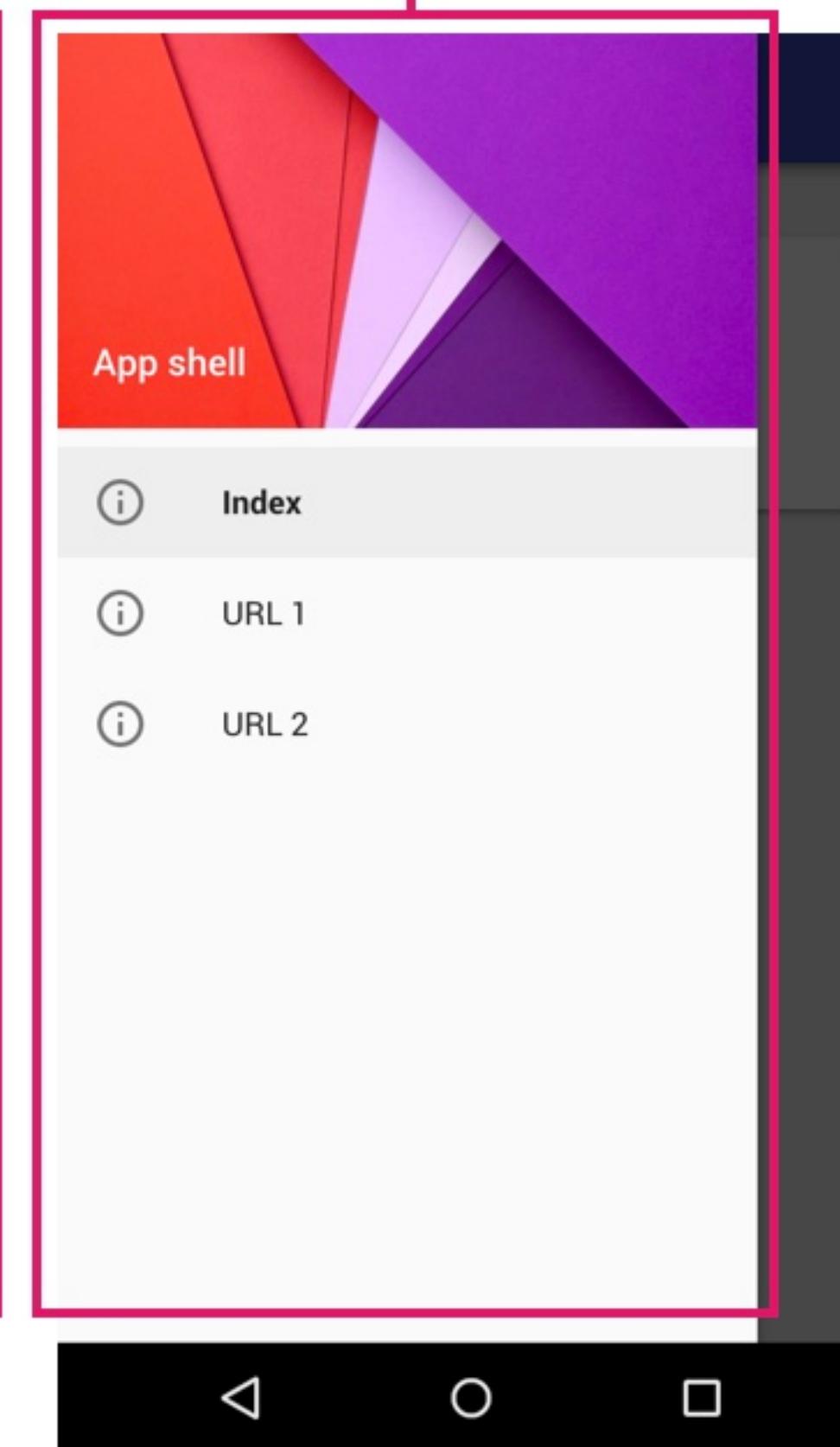
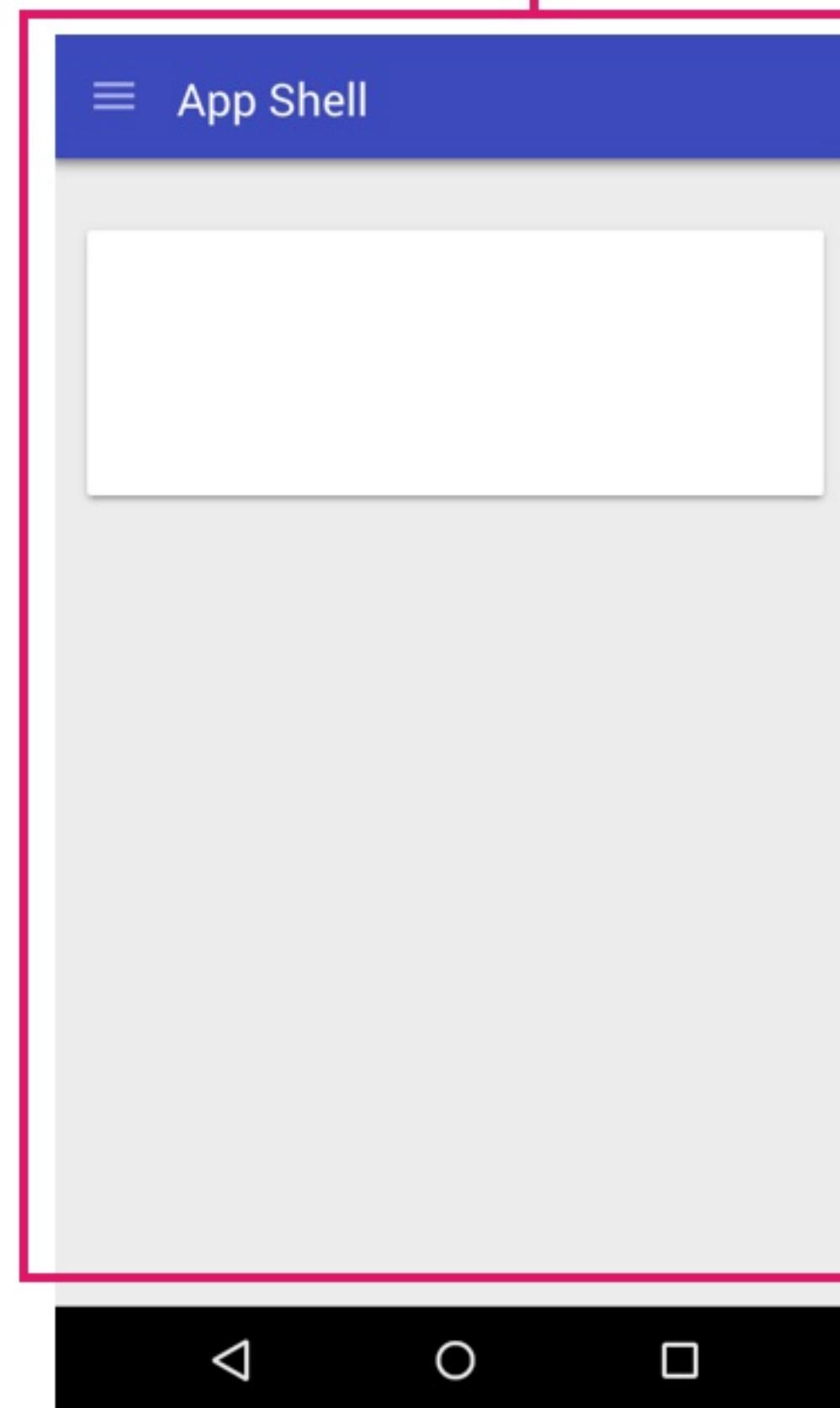


# APP STORES



# APP SHELL

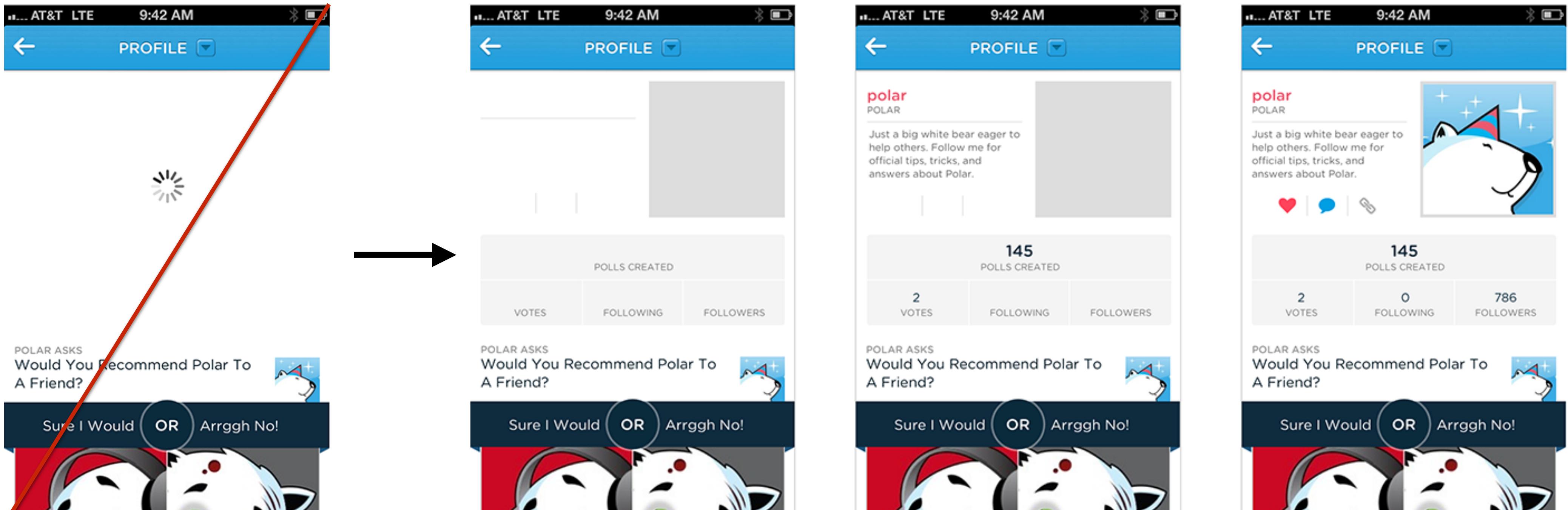
application shell



content



# SKELETONS



# NO REFLOWS

The screenshot shows a web browser window with the URL [aftonbladet.github.io/demos/responsive-images/reflow.html/demo](http://aftonbladet.github.io/demos/responsive-images/reflow.html/demo) in the address bar. The page itself is from Smashing Magazine, featuring their logo (a stylized 'S' icon) and the text "SMASHING MAGAZINE". Below the logo, there's a large heading: "Responsive Images: Reflow demo". A subtext below the heading reads: "This page is part of the Smashing Magazine article by [Tobias Järlund](#) and [Anders Andersen](#)". A bold warning section follows: "WARNING: This page will reflow" with a list of three items: "Load page and scroll down.", "Images are loaded with 500ms delay to simulate a slow connection", and "Back to article". Below this, there's a heading "Heading 1" and a large image of a man looking stressed or confused. To the right of the image, the text "Load page and scroll down" is displayed.

This page is part of the Smashing Magazine article by [Tobias Järlund](#) and [Anders Andersen](#)

**WARNING: This page will reflow**

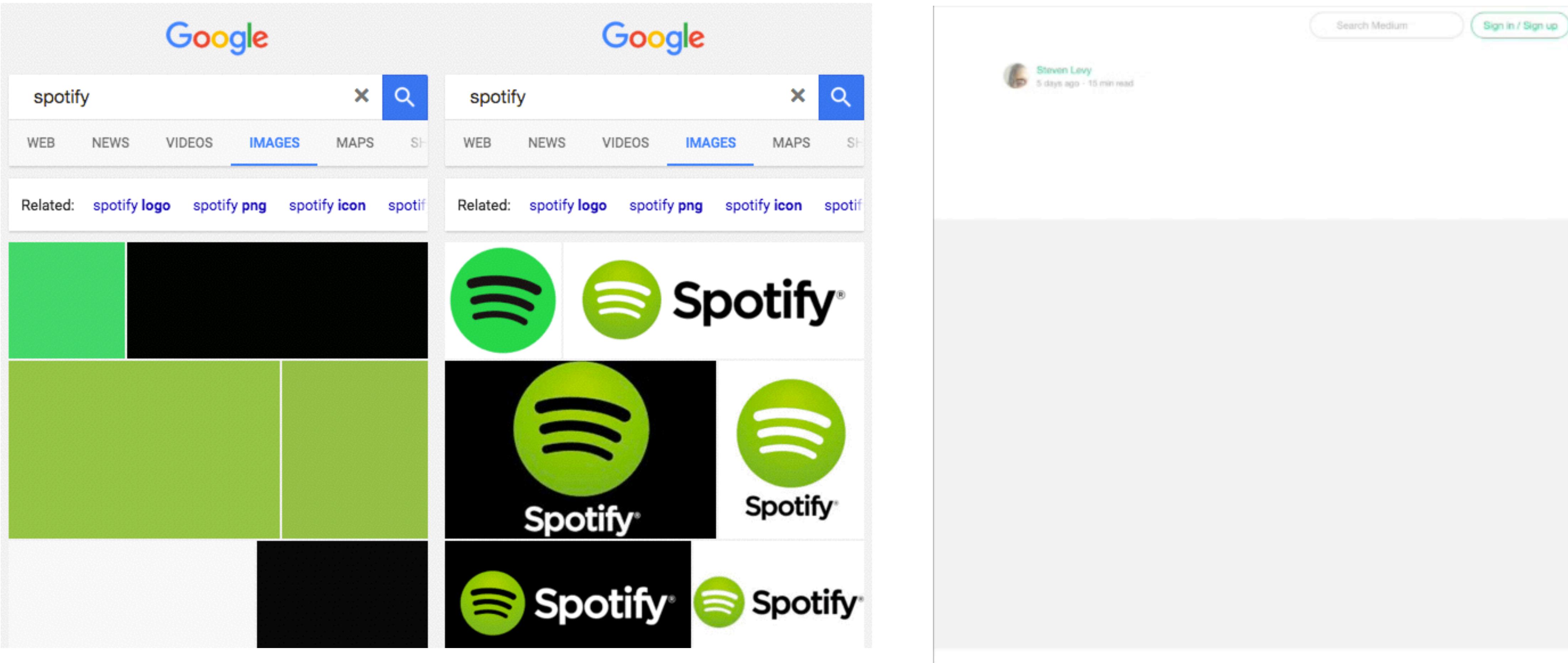
- Load page and scroll down.
- Images are loaded with 500ms delay to simulate a slow connection
- [Back to article](#)

**Heading 1**

Load page and scroll down

[smashingmagazine.com/2013/09/responsive-images-performance-problem-case-study](http://smashingmagazine.com/2013/09/responsive-images-performance-problem-case-study)

# IMAGE PLACEHOLDERS



[jmperezperez.com/medium-image-progressive-loading-placeholder/](http://jmperezperez.com/medium-image-progressive-loading-placeholder/)

# SYSTEM FONTS

The quick brown fox jumps over the lazy dog.

Fira Sans Firefox OS

The quick brown fox jumps over the lazy dog.

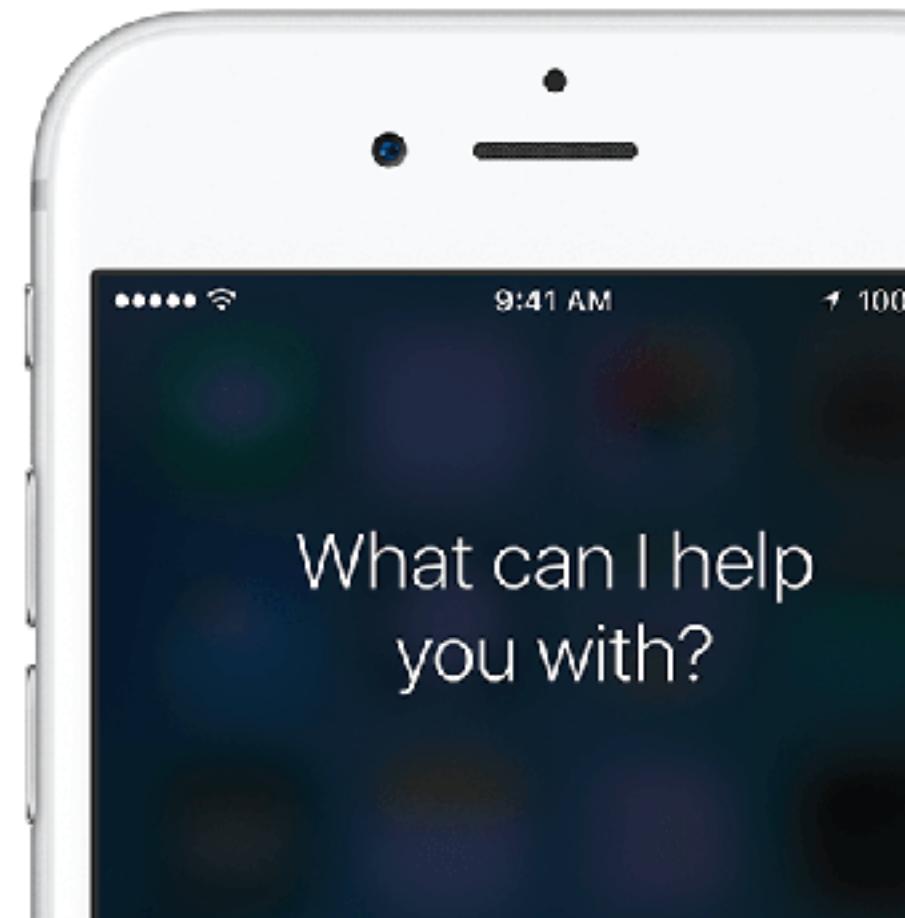
Roboto Android and Chrome OS

The quick brown fox jumps over the lazy dog.

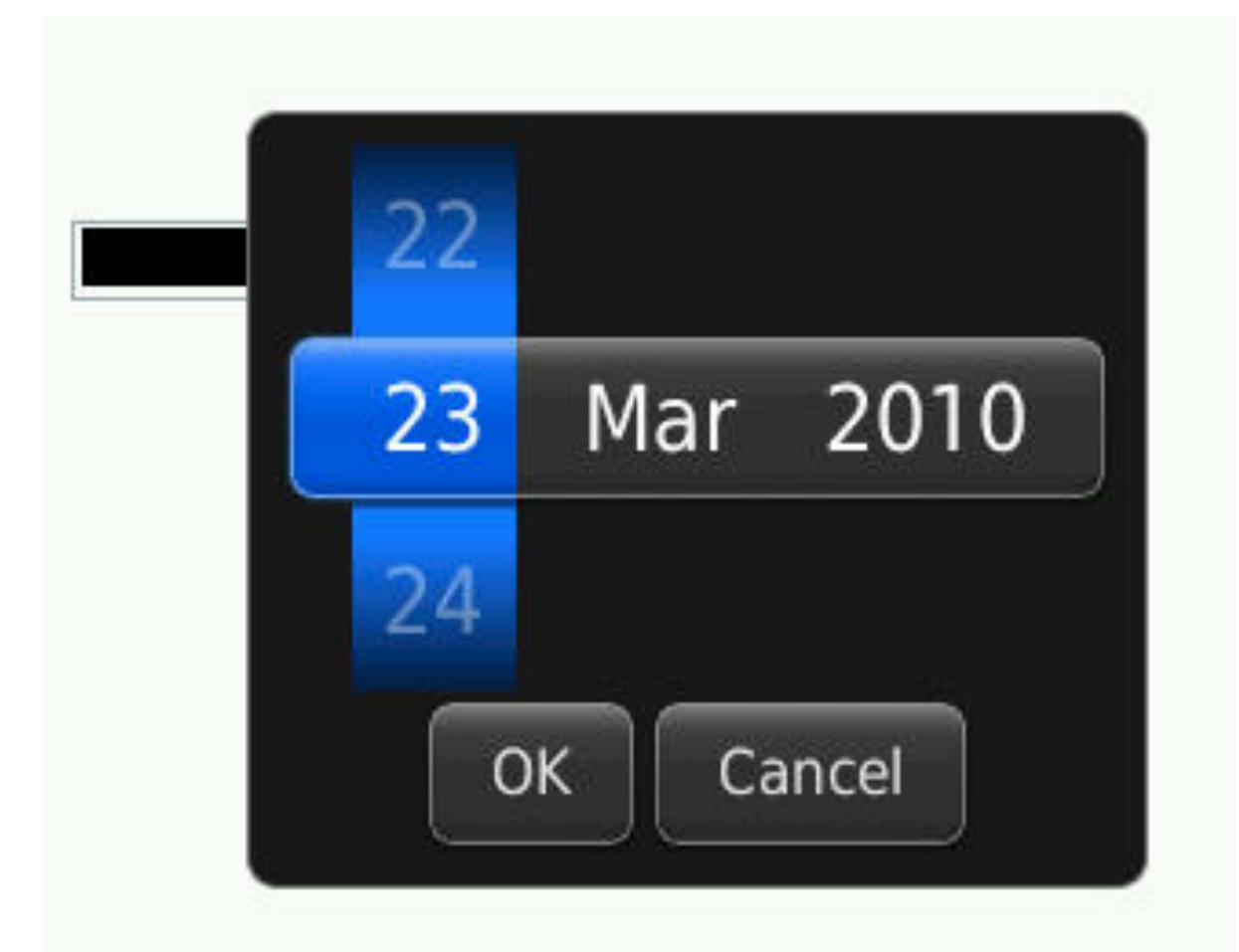
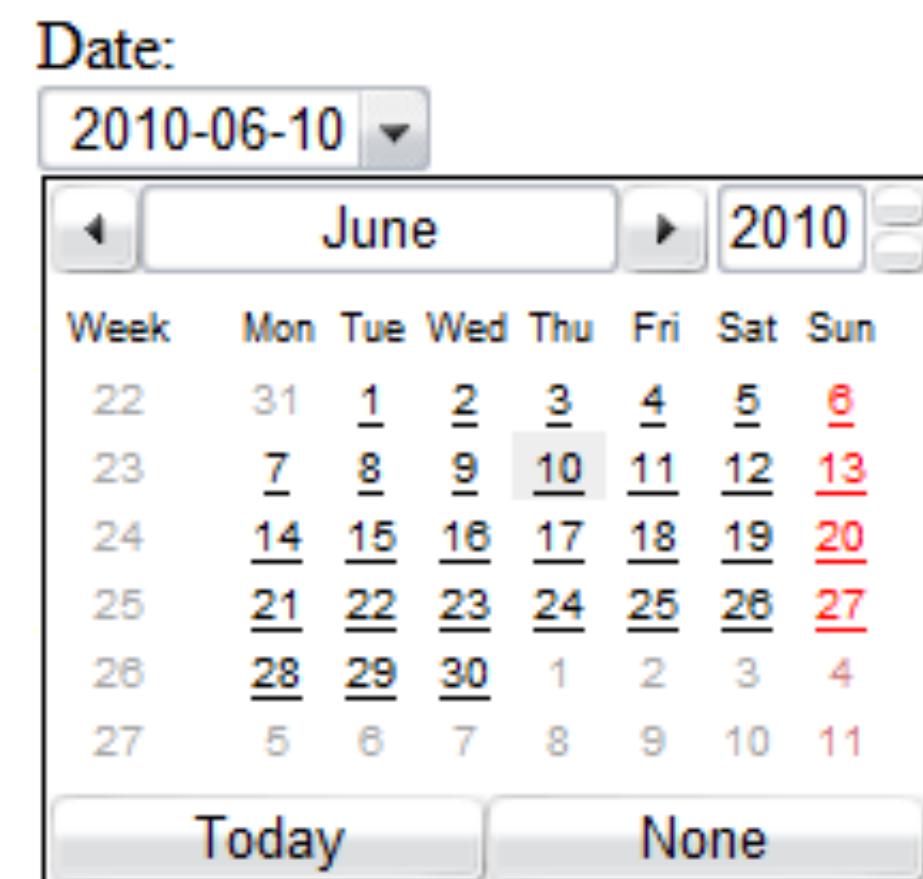
San Francisco iOS and Mac OS

The quick brown fox jumps over the lazy dog.

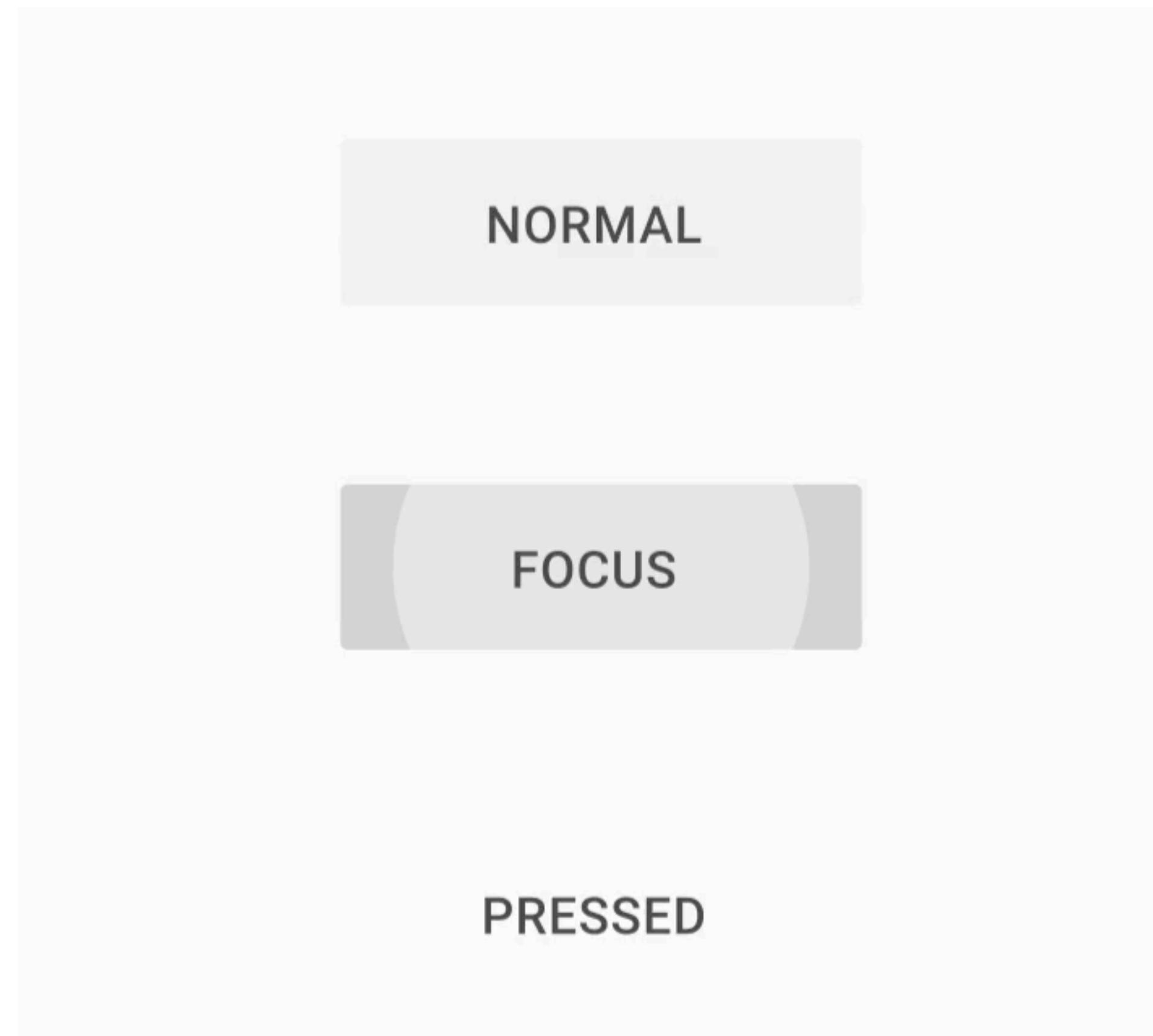
Segoe UI Windows and Windows Phone



# NATIVE INPUT TYPES



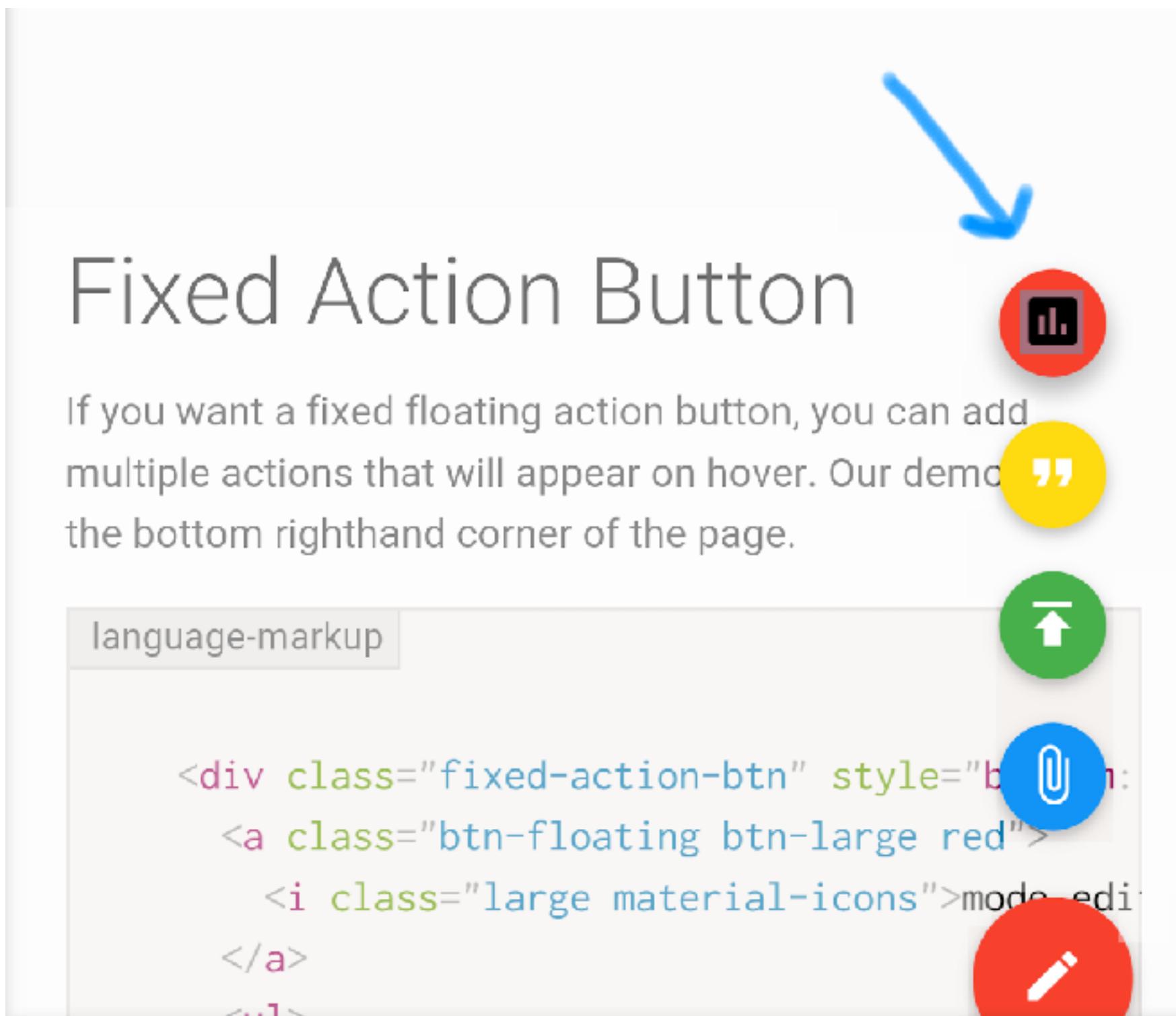
# TOUCH FEEDBACK



# NON-SELECTABLE NON-CONTENT

## Fixed Action Button

If you want a fixed floating action button, you can add multiple actions that will appear on hover. Our demo shows the bottom righthand corner of the page.

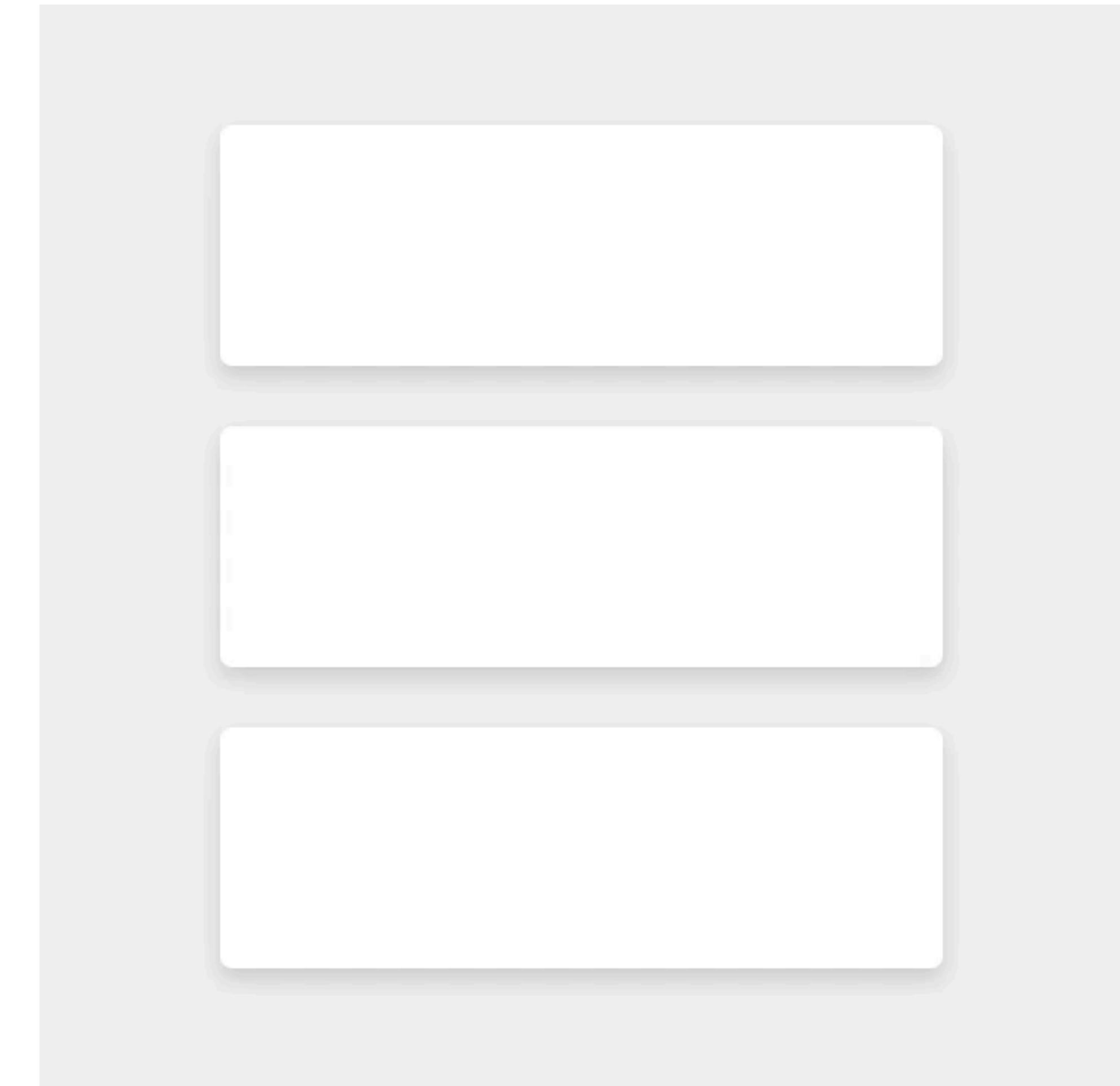
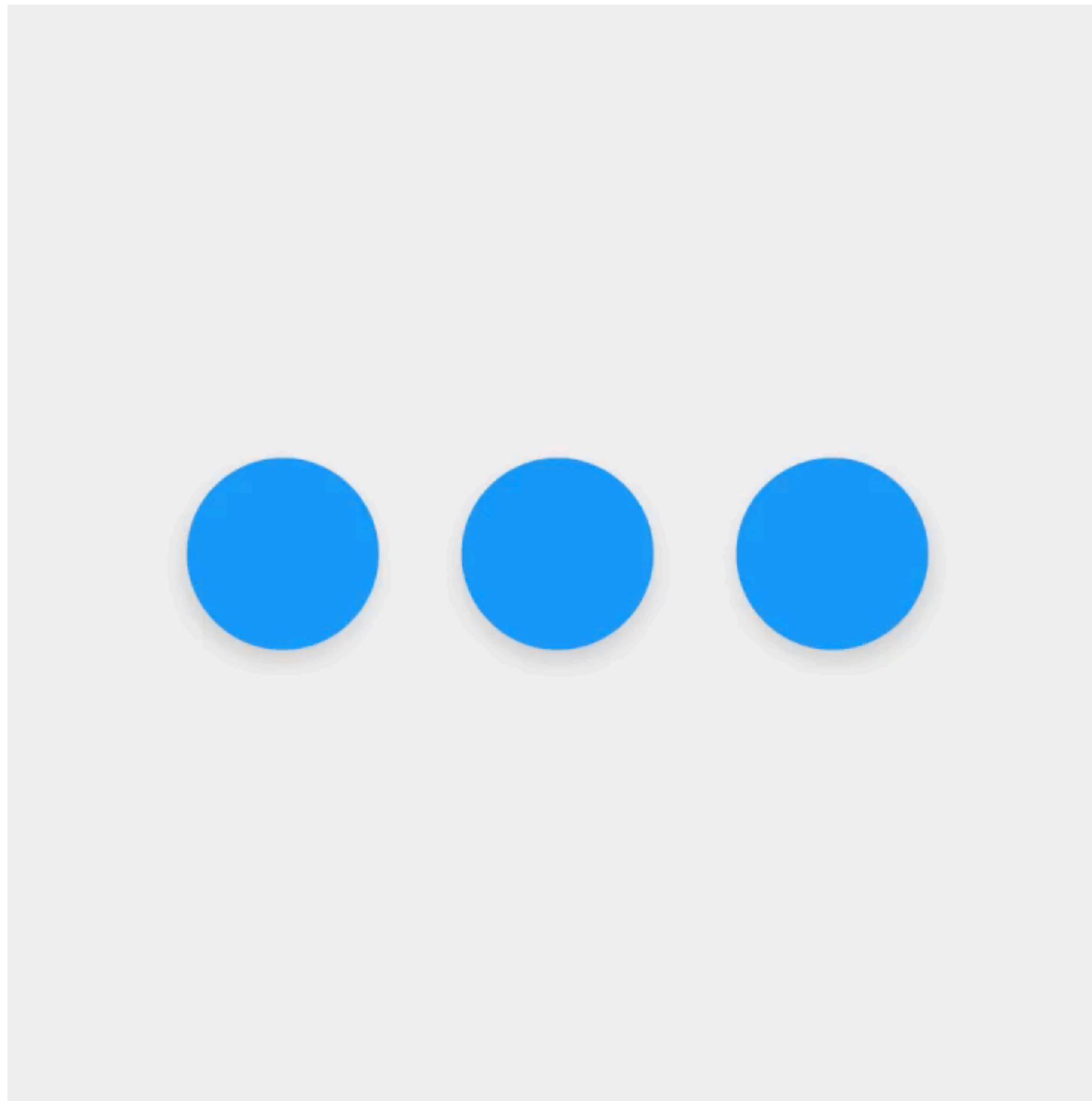


insert\_chart

^

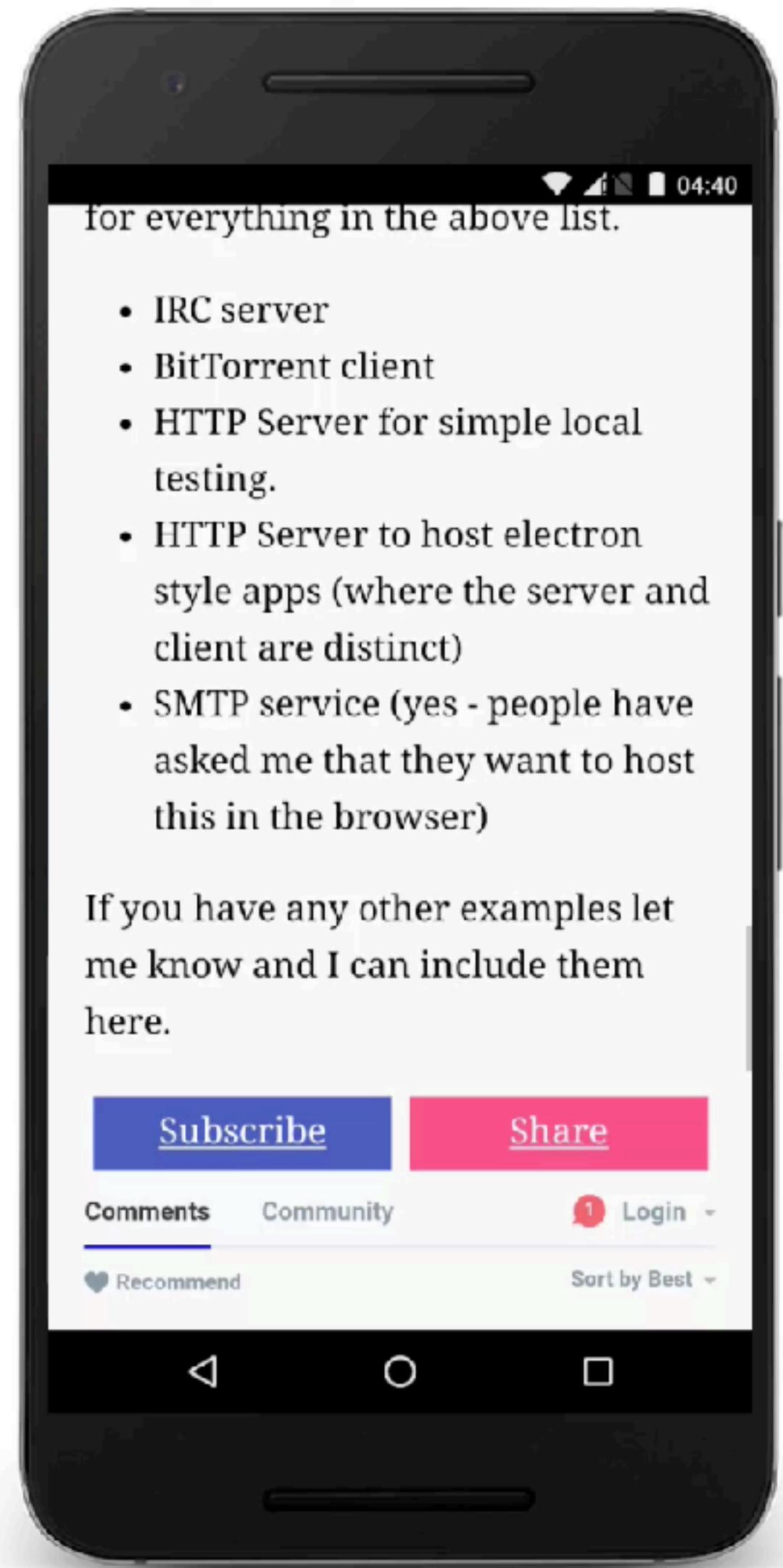


# SMOOTH ANIMATIONS



[material.google.com/motion](https://material.google.com/motion)

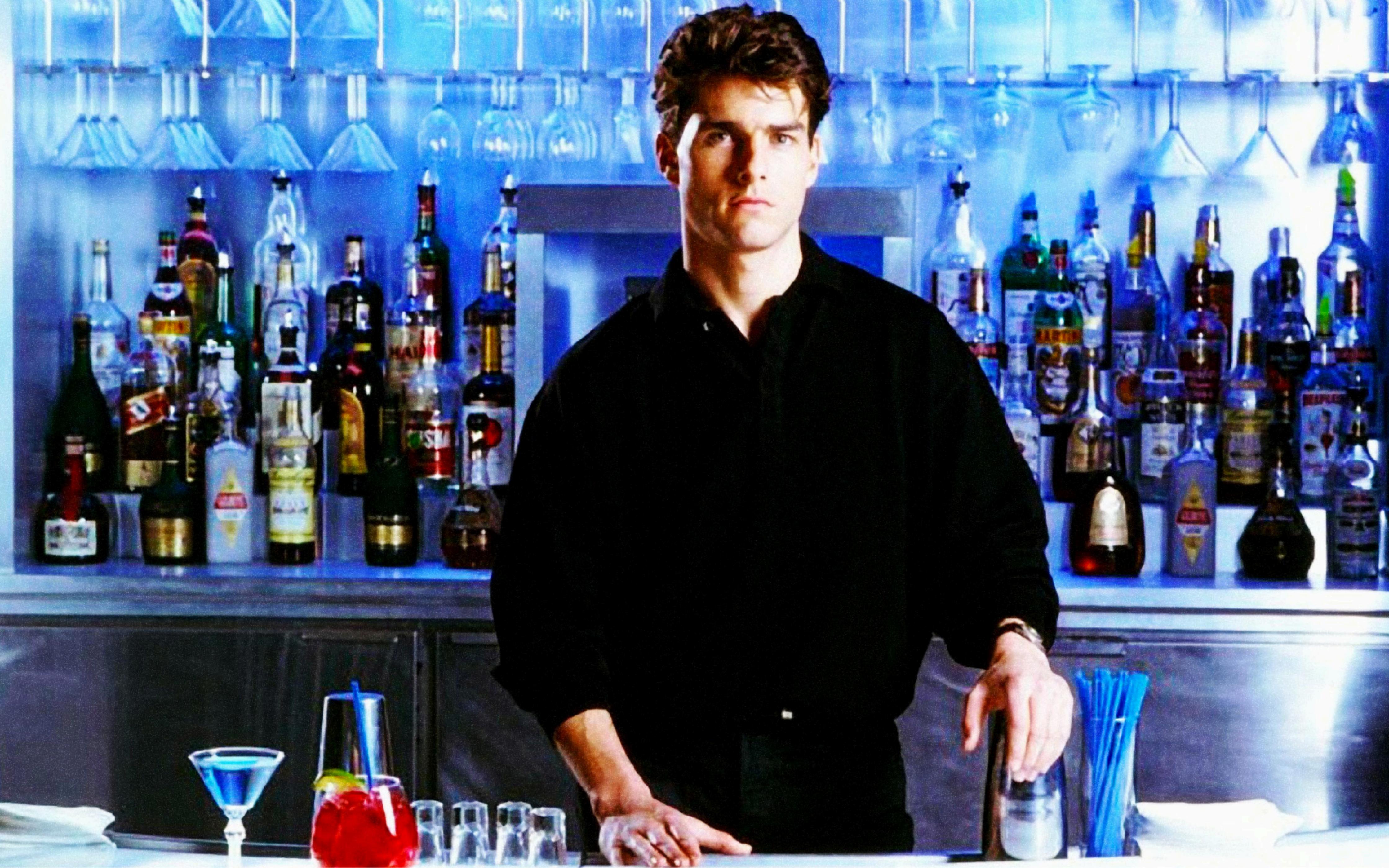
# NATIVE SHARE



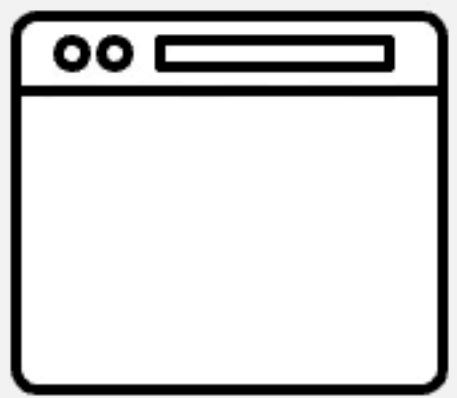
[paul.kinlan.me/navigator.share](http://paul.kinlan.me/navigator.share)

# THE SERVICE WORKER

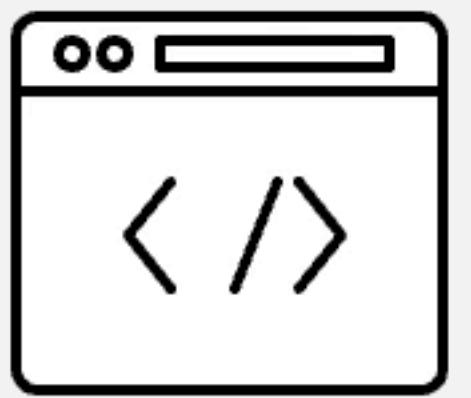




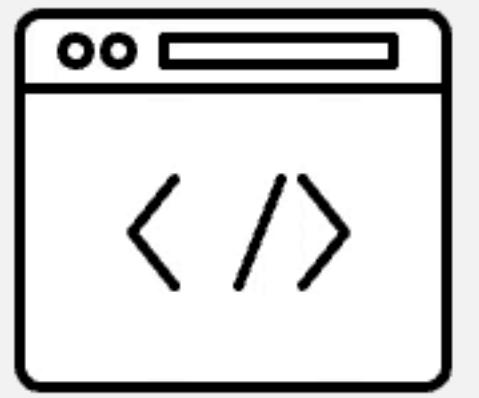
# INITIAL PAGE LOAD



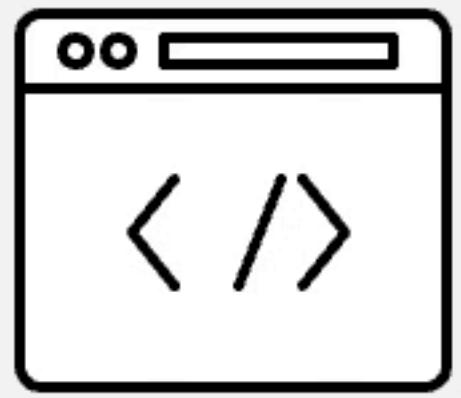
# REGISTER SERVICE WORKER



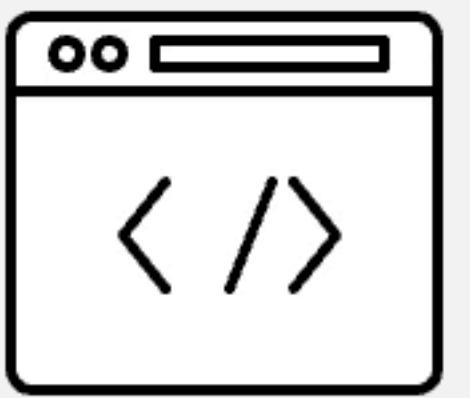
# SERVICE WORKER AS PROXY



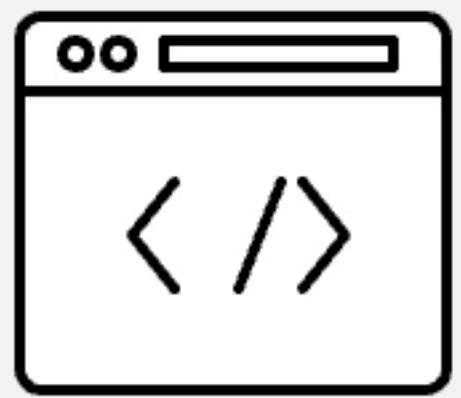
# HIJACK FETCH



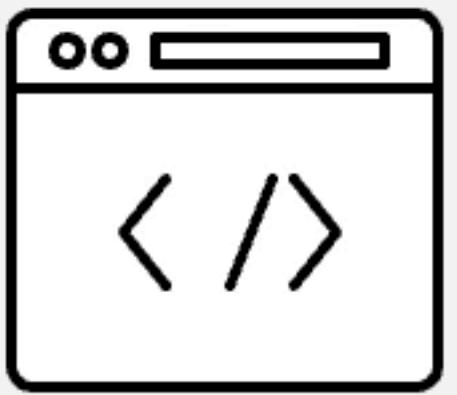
# CACHE ON INSTALL



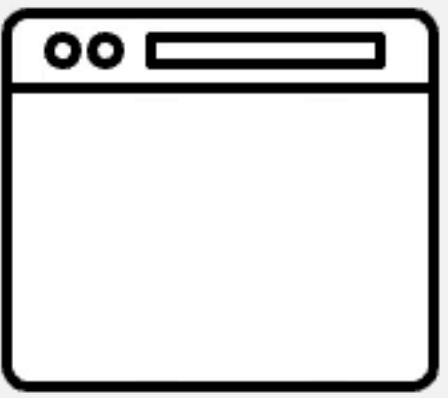
# CACHE ON FETCH



# SERVE FROM CACHE

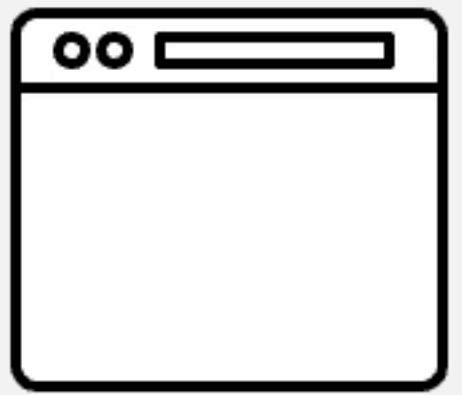


# UPDATE SERVICE WORKER



# CLEAN ON ACTIVATE

[...]



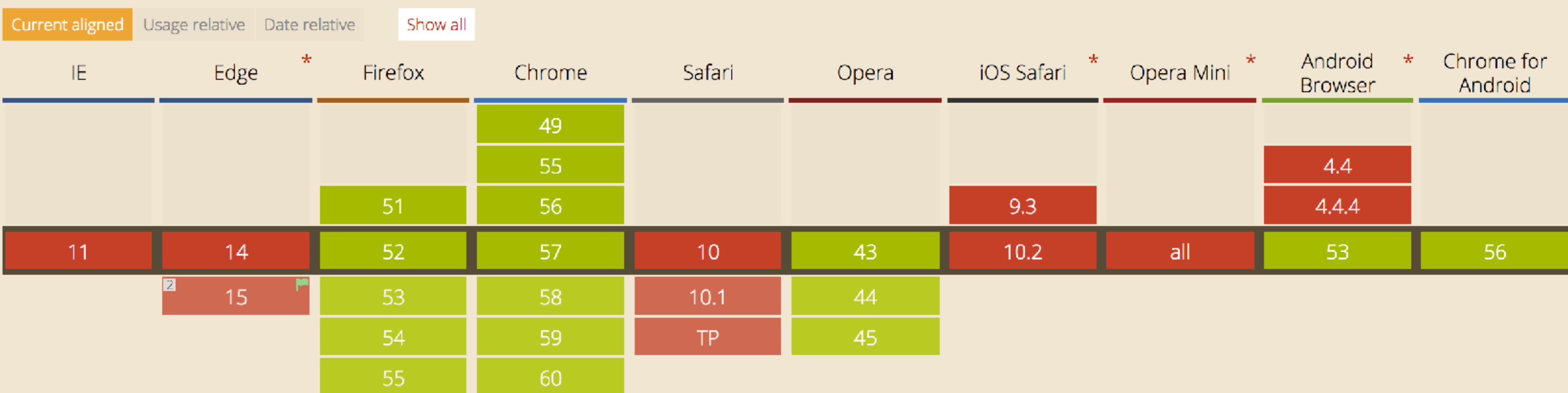
# SERVICE WORKER SUPPORT

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.

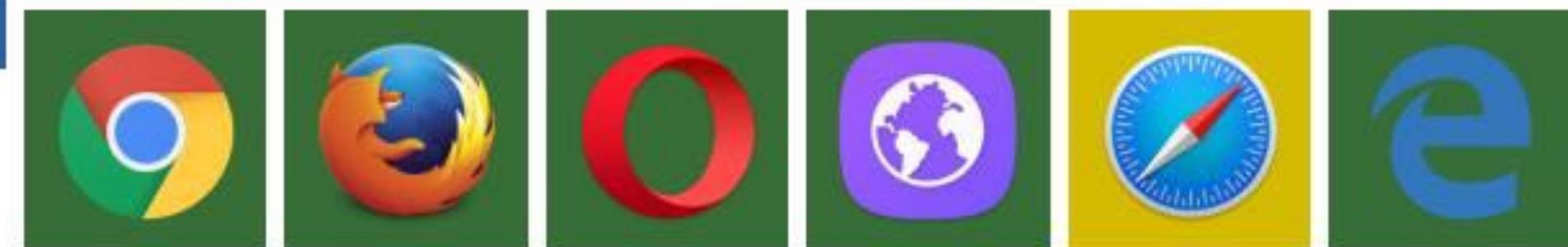


# is SERVICEWORKER ready?

[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.)

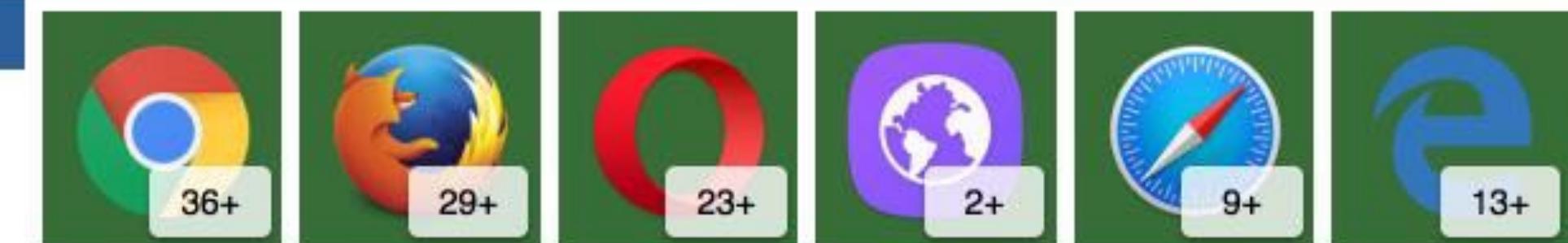
**Safari:** [Under consideration](#), Brief positive signals in [five year plan](#).

**Edge:** [In development](#).

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

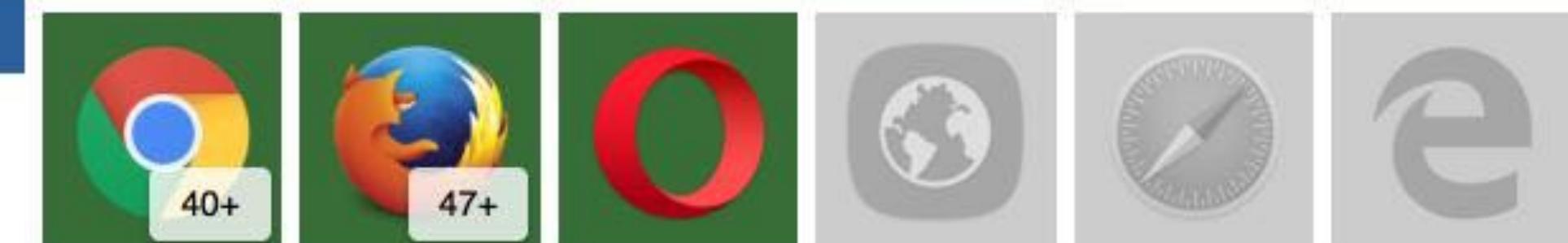
## Promises

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



## Debugging

State of debugging tools.



fetch(request)

Spec. Test.

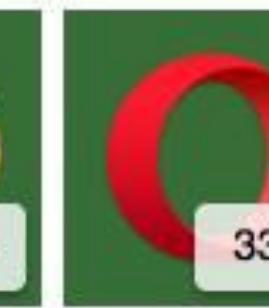


Safari: Support landing in Safari 10.1 beta

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.**

# PWA TOOLING



# CHROME DEVTOOLS > MANIFEST

The screenshot illustrates the process of viewing the App Manifest for a mobile application using Chrome DevTools. On the left, a smartphone displays the Tradus mobile website, which features a yellow bulldozer and a search bar. An arrow points from the phone to the DevTools interface on the right. The DevTools window shows the 'Application' tab selected (circled in black). The 'Manifest' item under the Application section is also highlighted in blue. The main panel displays the 'App Manifest' details, including the URL <https://www.tradus.com/themes/custom/tradus/assets/favicon/manifest.json>. The manifest includes sections for Identity (Name: Tradus, Short name: Tradus), Presentation (Start URL: /?homescreen=1, Theme color: #FD9645, Background color: #FFFFFF, Orientation: portrait, Display: standalone), and Icons (various sizes and file types shown). A large blue arrow points upwards from the DevTools interface towards the phone screen.

Nexus 5X ▾ 412 x 732 75% ▾

Elements Console Sources Network Timeline Profiles Application Security Audits

App Manifest

<https://www.tradus.com/themes/custom/tradus/assets/favicon/manifest.json>

Identity

Name Tradus  
Short name Tradus

Presentation

Start URL /?homescreen=1  
Theme color #FD9645  
Background color #FFFFFF  
Orientation portrait  
Display standalone

Icons

36x36 image/png 

48x48 image/png 

72x72 image/png 

96x96 image/png 

144x144 

Add to homescreen

# CHROME DEVTOOLS > A2HS

Add this site to your shelf to use it any time. ←

Nexus 5X ▾ 412 × 732 75% ▾

Elements Console Sources Network Timeline Profiles Application Security Audits

Application

- Manifest
- Service Workers
- Clear storage

Storage

- Local Storage
- Session Storage
- IndexedDB
- Web SQL
- Cookies

Cache

- Cache Storage
- Application Cache

Frames

- top

App Manifest

<https://www.tradus.com/themes/custom/tradus/assets/favicon/manifest.json>

Identity

Name Tradus  
Short name Tradus

Presentation

Start URL /?homescreen=1  
Theme color #FD9645  
Background color #FFFFFF  
Orientation portrait  
Display standalone

Icons

Size	Type	Icon
36x36	image/png	
48x48	image/png	
72x72	image/png	

Console

Preserve log

Add x

Ad to homescreen

The screenshot shows the Chrome DevTools Application panel for the Tradus website. On the left, there's a mobile device simulation displaying the Tradus homepage with a yellow excavator and search bars. The main panel shows the App Manifest configuration. It includes sections for Identity (Name: Tradus, Short name: Tradus), Presentation (Start URL: /?homescreen=1, Theme color: #FD9645, Background color: #FFFFFF, Orientation: portrait, Display: standalone), and Icons (three sizes: 36x36, 48x48, 72x72, all in image/png format). At the top of the main panel, there's a message "Add this site to your shelf to use it any time." with a blue arrow pointing to the right. On the far right, there's a "Add" button and a circled "Add to homescreen" link. The bottom of the panel has a "Console" tab and a "Preserve log" checkbox.

# MANIFEST GENERATOR

Web App Manifest Generator

MDN Spec 

💡 Web App Manifests are one of the key pieces to making your web app look and feel like a native app. [Learn more](#)

While everything is optional, once certain [criteria](#) is met, some browsers will automatically display an install banner for your app

Name

My Progressive App

Name of your web app

Short Name

My App

This will be used when there is insufficient space to display the full name, such as the homescreen

More...

Start URL

/?homescreen=1

Your homescreen shortcut will load this URL

More...

Display

Standalone

An app-like experience, no browser UI, only system UI

Fullscreen

manifest.json

Copy

```
{  
  "name": "My Progressive App",  
  "short_name": "My App",  
  "lang": "en-US",  
  "start_url": "/?homescreen=1",  
  "display": "standalone"  
}
```



<head>

Copy

```
<link rel="manifest" href="manifest.json">  
  
<meta name="mobile-web-app-capable" content="yes">  
<meta name="apple-mobile-web-app-capable" content="yes">  
<meta name="application-name" content="My App">  
<meta name="apple-mobile-web-app-title" content="My App">  
<meta name="msapplication-starturl" content="/?homescreen=1">  
<meta name="viewport" content="width=device-width, initial-scale=1.0">
```



[tomitm.github.io/appmanifest/](https://tomitm.github.io/appmanifest/)

# APP IMAGE GENERATOR

[PWA Builder](#)[Documentation](#)[App Image Generator](#)[Github](#)

## App Image Generator

Quickly and easily create app icons for various platforms in the right size and format

### Image Details

Specify the image details below.

#### Input Image

#### Padding

0 is no padding, 1 is 100% of the source image. 0.3 is a typical value for most icons

#### Background Color

 Transparent Custom color

### Platforms

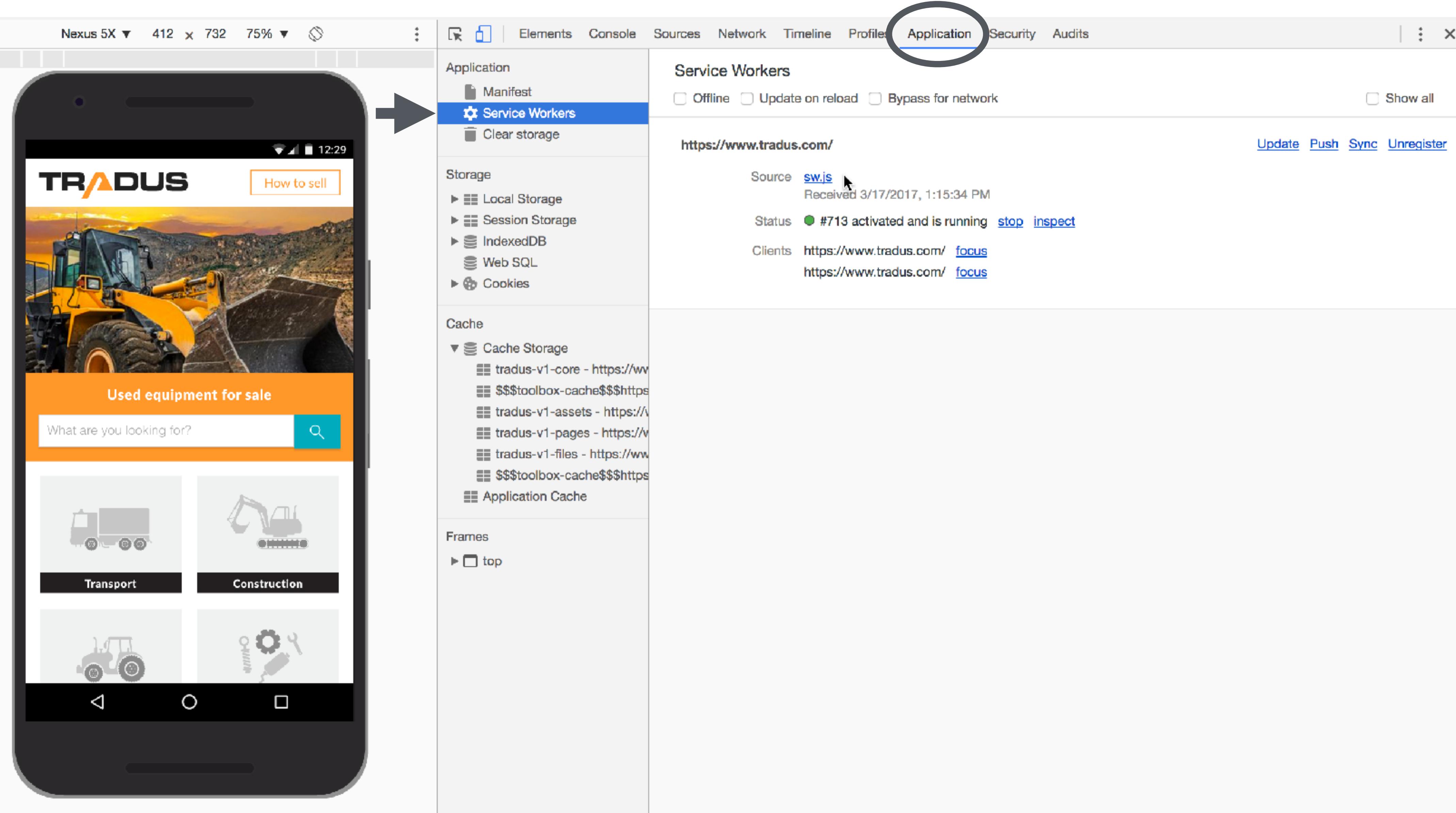
Select the platforms to generate images for.

(\*) windows platform generates images for Windows 8.1 and Windows Phone 8.1 apps.

 windows10 windows \* android ios chrome firefox

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

# CHROME DEVTOOLS > SERVICE WORKERS



The image shows a comparison between a mobile browser screenshot and the Chrome DevTools Application panel.

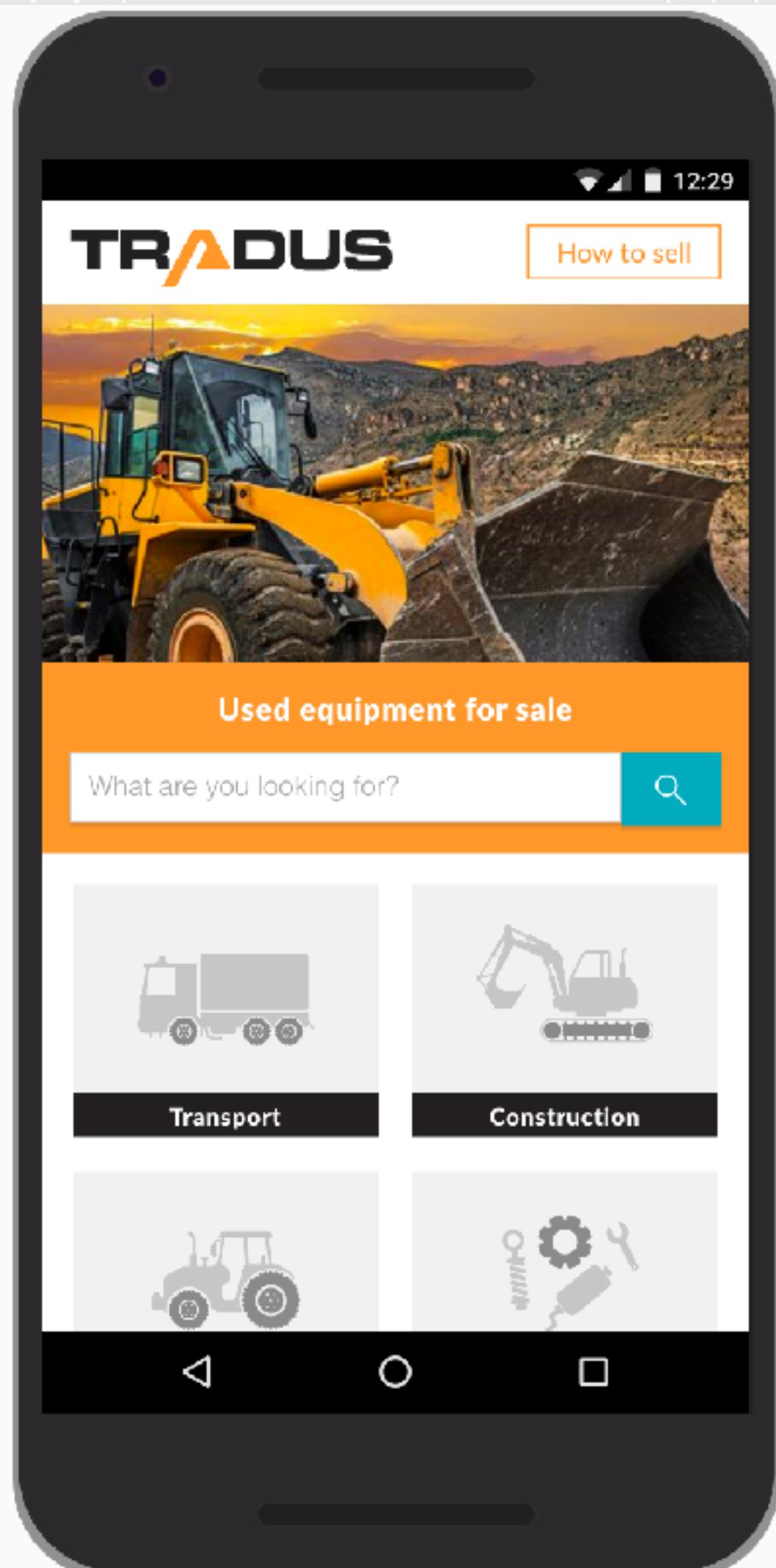
**Mobile Browser Screenshot:** On the left, a Nexus 5X mobile device displays the Tradus website. The screen shows a yellow bulldozer at a construction site, with the header "TRADUS" and a "How to sell" button. Below the image, an orange bar reads "Used equipment for sale". A search bar with placeholder text "What are you looking for?" and a magnifying glass icon is visible. At the bottom, there are two categories: "Transport" (with a truck icon) and "Construction" (with an excavator icon).

**Chrome DevTools Application Panel:** On the right, the Chrome DevTools Application panel is open. The "Service Workers" tab is selected and highlighted with a blue background. A large arrow points from the mobile browser screenshot towards this tab. The "Service Workers" section shows the following details for the URL <https://www.tradus.com/>:

- Source: [sw.js](#) (Received 3/17/2017, 1:15:34 PM)
- Status: ● #713 activated and is running ([stop](#) [inspect](#))
- Clients: <https://www.tradus.com/> [focus](#), <https://www.tradus.com/> [focus](#)

The left sidebar of the DevTools panel lists other sections: Application (selected), Manifest, Service Workers (highlighted in blue), and Clear storage. Other sections include Storage (Local Storage, Session Storage, IndexedDB, Web SQL, Cookies), Cache (Cache Storage, Application Cache), and Frames (top).

# CHROME DEVTOOLS > NETWORK



Nexus 5X ▾ 412 x 732 75% ▾

Elements Console Sources Network Timeline Profiles Application Security Audits

312ms

domain:www.tradus.com | View: Preset log | Disable cache | Offline | No throttling

RegEx Hide data URLs All XHR JS CSS Img Media Font Doc WS Manifest Other

200ms 400ms 600ms 800ms 1000ms 1200ms 1400ms 1600ms

Name Status Proto... Type Initiator Size Time Priority Cache-Control Content-Type S... Waterfall

www.tradus.com 200 OK http/... document Other (from ServiceWorker) 213... 212... Highest must-revalidate, ... gzip n... 250.00 ms

logo-tradus-color.svg?1489... 200 OK http/... svg+xml (index) Parser (from ServiceWorker) 0ms 0ms Lowest max-age=1209600 n... 250.00 ms

index.css?1489678177 200 OK http/... styles... (index) Parser (from ServiceWorker) 9ms 6ms Highest max-age=1209600 gzip n... 250.00 ms

e3e83d6ae2dc019ac141ac... 200 OK http/... jpeg (index) Parser (from ServiceWorker) 0ms 0ms Lowest max-age=1209600 n... 250.00 ms

index.js?1489668386 200 OK http/... script (index) Parser (from ServiceWorker) 11ms 7ms Low max-age=1209600 gzip n... 250.00 ms

29db8a33c533dc2f4c7070... 200 OK http/... jpeg (index) Parser (from ServiceWorker) 0ms 0ms Lowest max-age=1209600 n... 250.00 ms

110c2402a7c1474872dfa1... 200 OK http/... jpeg (index) Parser (from ServiceWorker) 0ms 0ms Lowest max-age=1209600 n... 250.00 ms

1c750145af070cc3a075b7... 200 OK http/... jpeg (index) Parser (from ServiceWorker) 0ms 0ms Lowest max-age=1209600 n... 250.00 ms

5bf0d6747dbd7e7d7b4ca7... 200 OK http/... jpeg (index) Parser (from ServiceWorker) 0ms 0ms Lowest max-age=1209600 n... 250.00 ms

61ef637d30d135c089b3d3... 200 OK http/... jpeg (index) Parser (from ServiceWorker) 0ms 0ms Lowest max-age=1209600 n... 250.00 ms

750fe46948193d938e298f7... 200 OK http/... jpeg (index) Parser (from ServiceWorker) 0ms 0ms Lowest max-age=1209600 n... 250.00 ms

27bff87baf0cb10e2513133... 200 OK http/... jpeg (index) Parser (from ServiceWorker) 0ms 0ms Lowest max-age=1209600 n... 250.00 ms

A large black arrow points downwards from the 'Network' tab in the top navigation bar towards the table below.

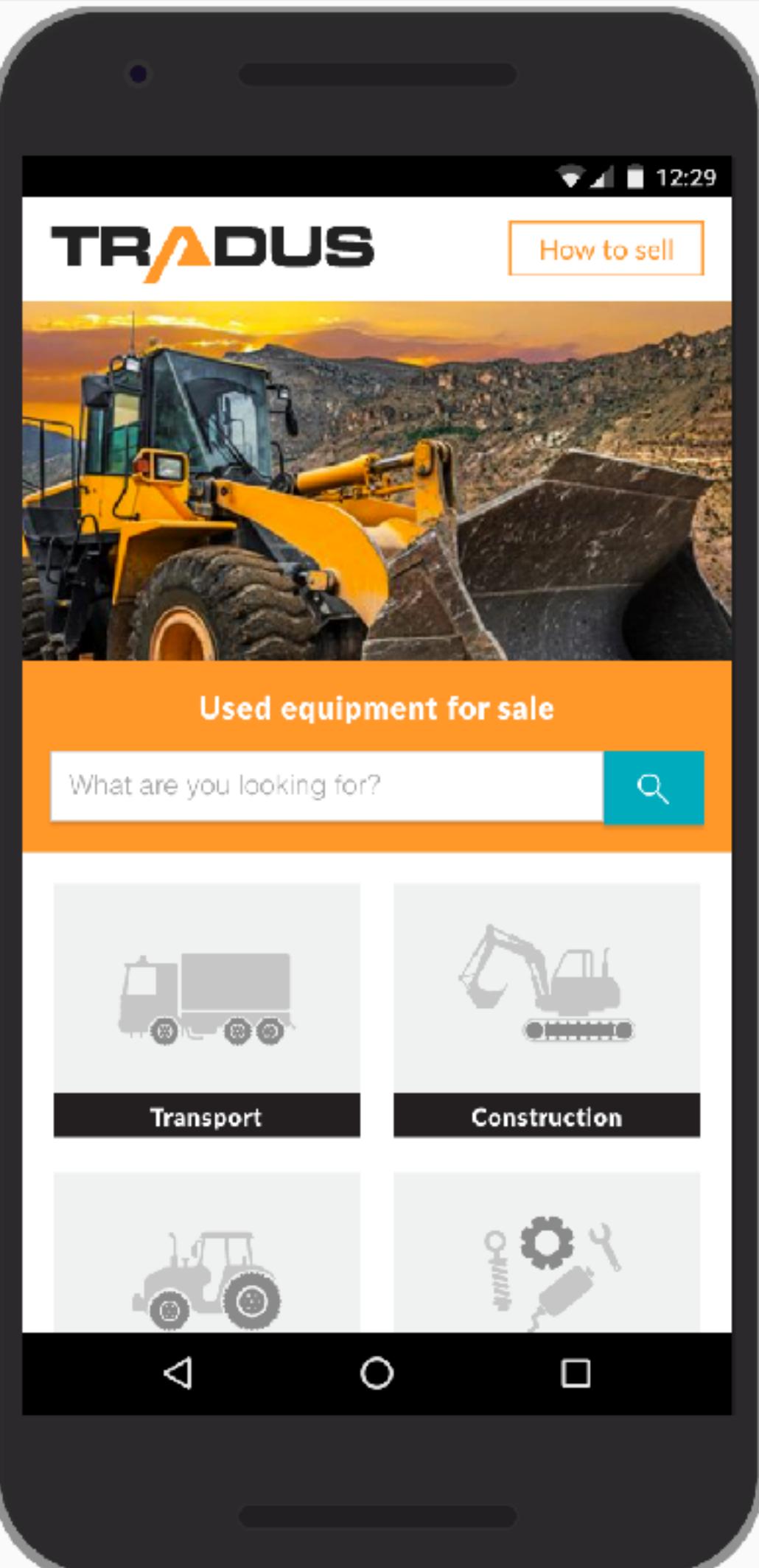
# CHROME DEVTOOLS > CACHE STORAGE

The image shows a comparison between a mobile browser interface and the Chrome DevTools Application tab.

**Mobile Browser View:** On the left, a screenshot of a Tradus mobile website is displayed on a Nexus 5X device. The site features a yellow bulldozer image, a search bar with placeholder text "What are you looking for?", and category icons for Transport and Construction.

**Chrome DevTools Application Tab:** On the right, the Chrome DevTools Application tab is open. The "Application" tab is highlighted with a blue underline and circled in black. The main pane displays the "Cache Storage" section, which lists several entries under the "tradus-v1-core - https://www.tradus.com" domain. One entry is selected, showing its details. The "Request" column lists URLs, and the "Response" column shows status codes like "OK". Other sections visible include "Manifest", "Service Workers", "Clear storage", "Storage" (Local Storage, Session Storage, IndexedDB, Web SQL, Cookies), and "Cache" (Cache Storage, Application Cache). A "Frames" section at the bottom lists "top".

# CHROME DEVTOOLS > CLEAR STORAGE



A screenshot of a mobile browser displaying the TRADUS website. The page shows a yellow bulldozer at a construction site, with the text "Used equipment for sale" and a search bar. Below the search bar are categories for "Transport" and "Construction". A large arrow points from the mobile screen to the Chrome DevTools interface.

Nexus 5X ▾ 412 x 732 75% ▾

Elements Console Sources Network Timeline Profiles Application Security Audits

Application

- Manifest
- Service Workers
- Clear storage**

Storage

- Local Storage
- Session Storage
- IndexedDB
- Web SQL
- Cookies

Cache

- Cache Storage
  - tradus-v1-core - https://www.tradus.com
  - \$\$\$toolbox-cache\$\$\$https://www.tradus.com
  - tradus-v1-assets - https://www.tradus.com
  - tradus-v1-pages - https://www.tradus.com
  - tradus-v1-files - https://www.tradus.com
  - \$\$\$toolbox-cache\$\$\$https://www.tradus.com
- Application Cache

Frames

- top

Clear storage

Application

- Unregister service workers

Storage

- Local and session storage
- Indexed DB
- Web SQL
- Cookies

Cache

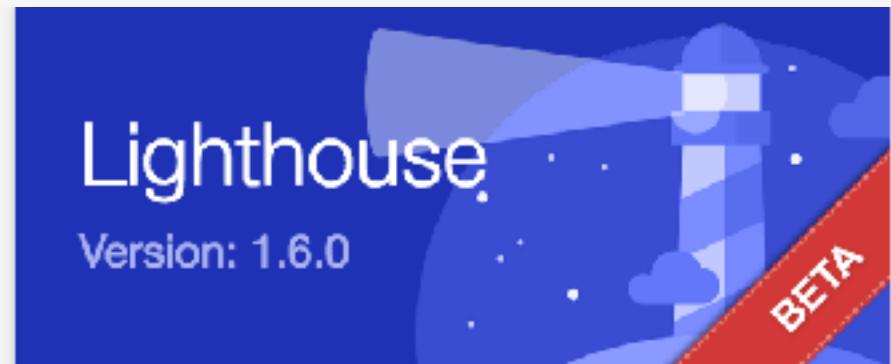
- Cache storage
- Application cache

Clear site data

# SERVICE WORKER RESET

```
self.addEventListener('install', function(event) {
  // delete all the caches
  event.waitUntil(
    caches.keys().then(function(keys) {
      return Promise.all(
        keys.map(function(key) {
          return caches.delete(key);
        })
      );
    })
  );
});
```

# LIGHTHOUSE



Results for: <https://www.tradus.com/>  
Generated on: 3/17/2017, 1:15:44 PM GMT+1 Export...

**100 / 100** **Progressive Web App**

These audits validate the aspects of a Progressive Web App. They are a subset of the [PWA Checklist](#).

- ✓ App can load on offline/flaky connections >
- ✓ Page load performance is fast >
- ✓ Site is progressively enhanced >
- ✓ Network connection is secure >
- ✓ User can be prompted to Add to Homescreen ▾

While users can manually add your site to their homescreen in the browser menu, the [prompt \(aka app install banner\)](#) will proactively prompt the user to install the app if the below requirements are met and the user has visited your site at least twice (with at least five minutes between visits).

  - ✓ Registers a Service Worker ?
  - ✓ Manifest exists ?
  - ✓ Manifest contains `start_url` ?
  - ✓ Manifest contains icons at least 144px: **found sizes: 144x144, 192x192, 256x256, 384x384, 512x512**
  - ✓ Manifest contains `short_name` ?
- ✓ Installed web app will launch with custom splash screen >
- ✓ Address bar matches brand colors >
- ✓ Design is mobile friendly >

[github.com/GoogleChrome/lighthouse](https://github.com/GoogleChrome/lighthouse)

# WEB PAGE TEST

The screenshot shows the WebPageTest interface with a dark blue header. The logo 'WEBPAGETEST' with 'PRIVATE INSTANCE' below it is on the left. A navigation bar at the top includes 'HOME' (highlighted in yellow), 'TEST RESULT', 'TEST HISTORY', 'DOCUMENTATION', and 'ABOUT'. Below the header, the main content area has a title 'Test a website's performance'. A large yellow input field contains the URL 'paulirish.com'. To the right of the input field is a large yellow button labeled 'START TEST'. Above the input field are three tabs: 'Advanced Testing' (selected), 'Visual Comparison', and 'Traceroute'. Below the input field are sections for 'Test Location' (dropdown menu) and 'Browser' (dropdown menu). A 'Test Settings' tab is selected in a row of tabs. Under 'Advanced Settings', there are several options: 'Connection' set to 'Mobile 3G - Fast (1.6 Mbps/768 Kbps 150ms RTT)', 'Number of Tests to Run' set to 'Up to 9' with a value of '1' in the input field, 'Repeat View' with radio buttons for 'First View and Repeat View' (unchecked) and 'First View Only' (checked), 'Capture Video' with a checked checkbox, 'Keep Test Private' with an unchecked checkbox, and a 'Label' input field.

[github.com/GoogleChrome/lighthouse/releases/tag/1.6.0](https://github.com/GoogleChrome/lighthouse/releases/tag/1.6.0)

# PWA LIBRARIES



# UP UP

The image shows a split-screen view. On the left is a code editor window titled 'index.html'. The code is written in HTML and lists two hotels: Hotel Trivelli and Le Domus del Senato, both located in Rome, Italy. On the right is a smartphone displaying a mobile web application for 'Top Hotels in Rome'. The phone's screen shows cards for 'Villa Domus' and 'Hotel Trivelli', each with a thumbnail image, the hotel name, a star rating, and the address 'Via Piacenza 9, Rome, Italy'. The phone's status bar shows the time as 9:19 PM and the battery level at 22%.

```
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>
```

# SW TOOLBOX

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

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

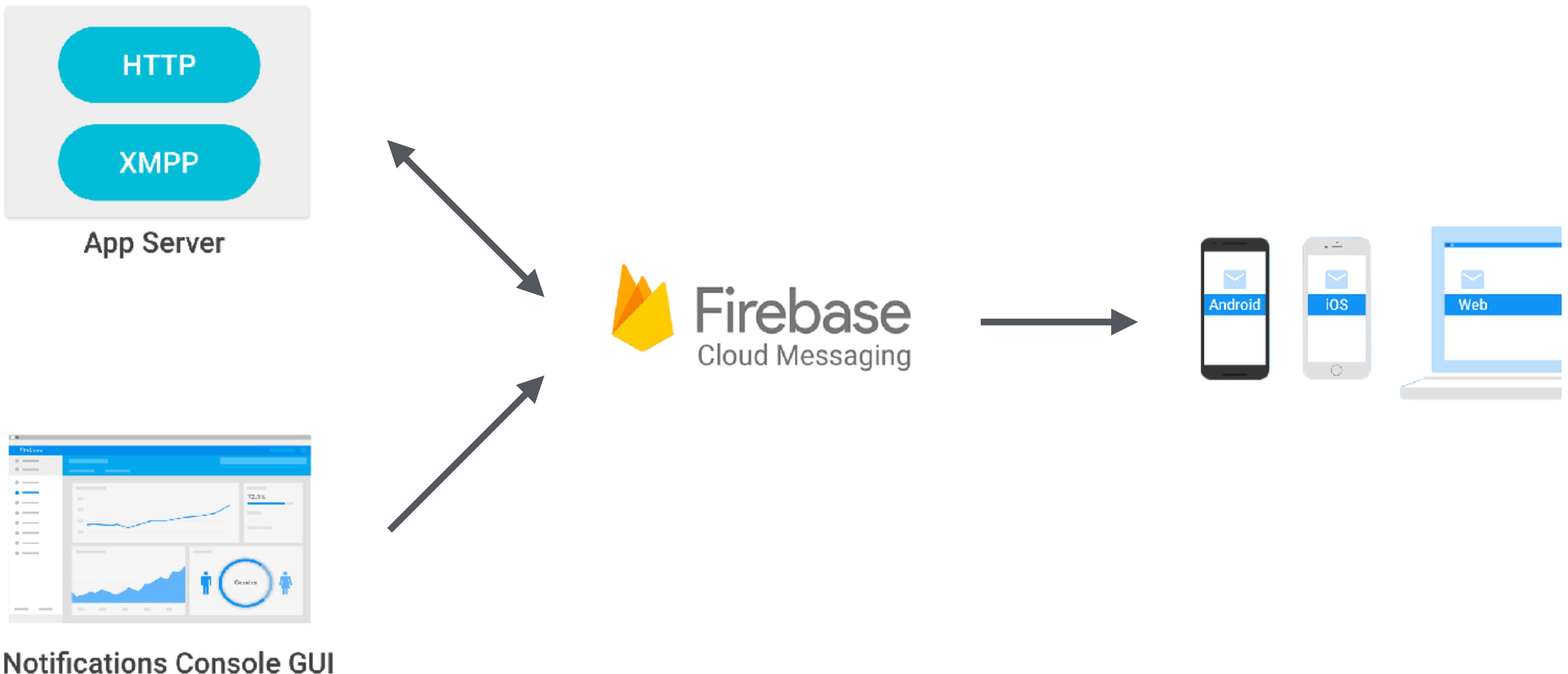
toolbox.router.get('/assets/*', toolbox.cacheFirst);

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/](https://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 page. A red "Get Started" button is at the bottom.

Web Push

Get Started

[onesignal.com](https://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