

Progressive Web Apps

Marc Robledo 2019

About me

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Apps vs. Web

Web in the 21th century

- ◆ 2000: web 2.0
- ◆ 2007: iPhone
- ◆ 2008: App Store
- ◆ 2009: HTML5
- ◆ 2012: Facebook HTML5 app



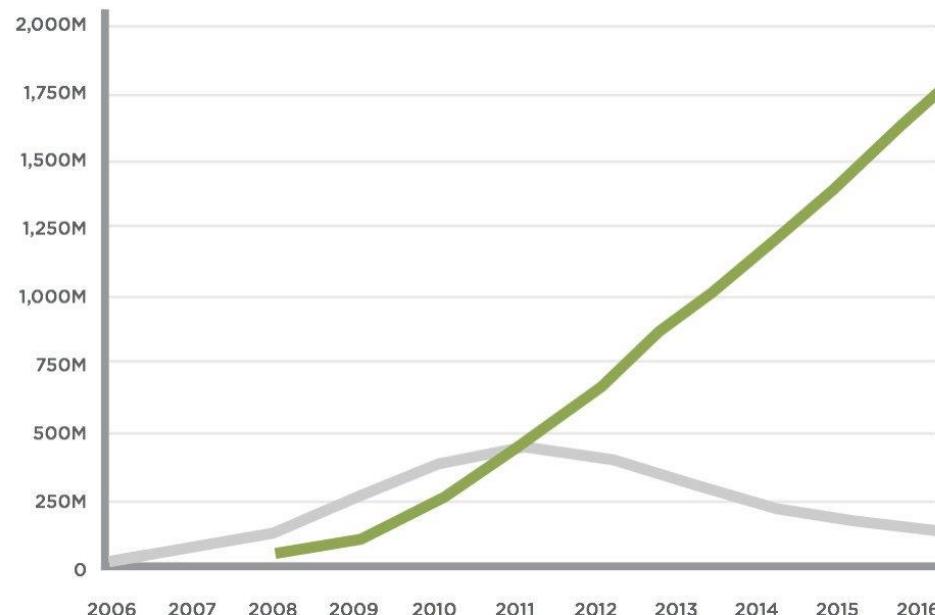
HTML



Facebook Monthly Active Users

2006

12M
DESKTOP MAU



2016

120M
DESKTOP MAU

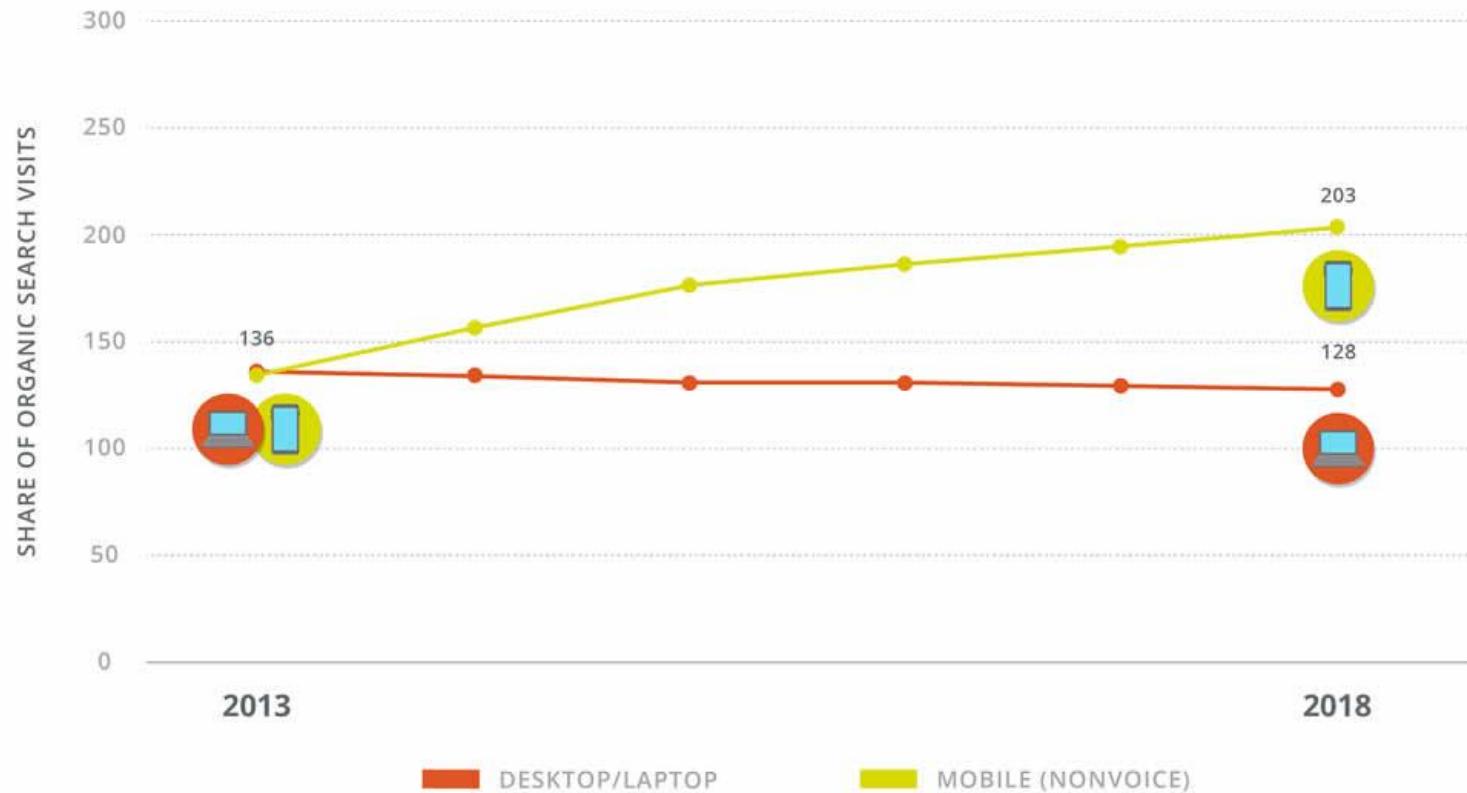
1,740M
MOBILE MAU

LUKEW
IDEATION + DESIGN

Source: Facebook, Quarterly Earnings Report & Press Releases

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AVERAGE DAILY MEDIA USE IN THE US, BY DEVICE (2013 VS 2018)



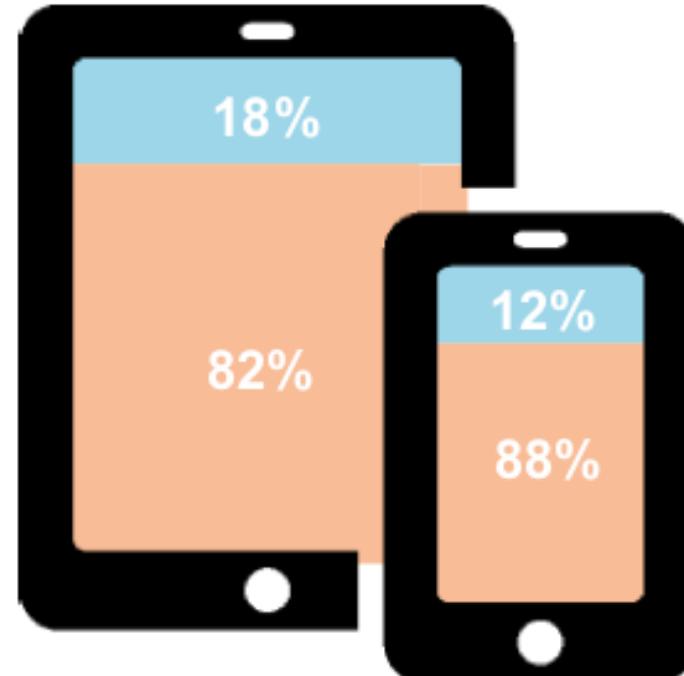
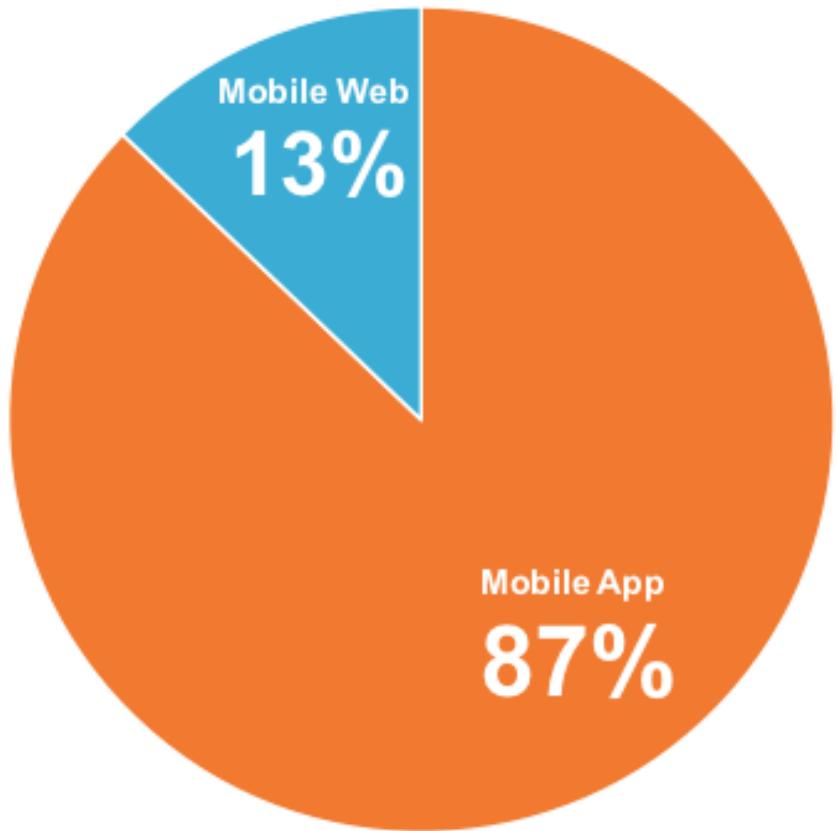
Source: <https://www.broadbandsearch.net/blog/mobile-desktop-internet-usage-statistics>

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Share of Time Spent on Mobile: App vs. Web

Source: comScore Mobile Metrix, U.S., Age 18+, June 2017



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Source: <http://indigital.esadeblogs.com/2018/03/02/an-in-depth-analysis-of-the-most-widely-used-apps-and-why-their-use-will-continue-growing-in-2018/>

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Web strikes back!

- ❖ 2017: PWA
- ❖ Main aim: turn the tables!
- ❖ Encouraged mostly by Google

What are PWA?

The best of both worlds

- ❖ Native apps have advantages...
- ❖ ...but also have disadvantages
- ❖ Web still has something to say!

Native advantages

- ❖ Great performance
- ❖ OS integration
- ❖ Fast boot
- ❖ Offline support



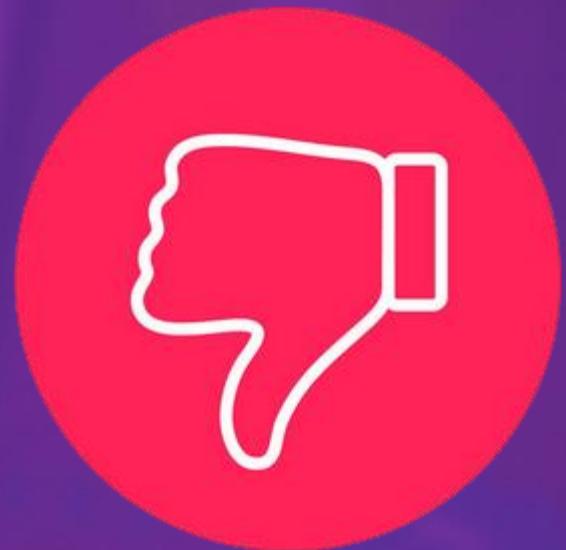
Native advantages

◆ Oh!
And they've got a cool
icon in your home
screen!



Native disadvantages

- ❖ Reachability
- ❖ Update delivering
- ❖ High memory usage:
RAM and storage
- ❖ Not everyone has a high end
smart device!



Progressive Web Apps

- ❖ Secure
- ❖ App-like+OS integration
- ❖ Engaging
- ❖ Fast + light-weight
- ❖ Reliability (Offline ready)
- ❖ Discoverability

Combining the best
of web apps and
native apps

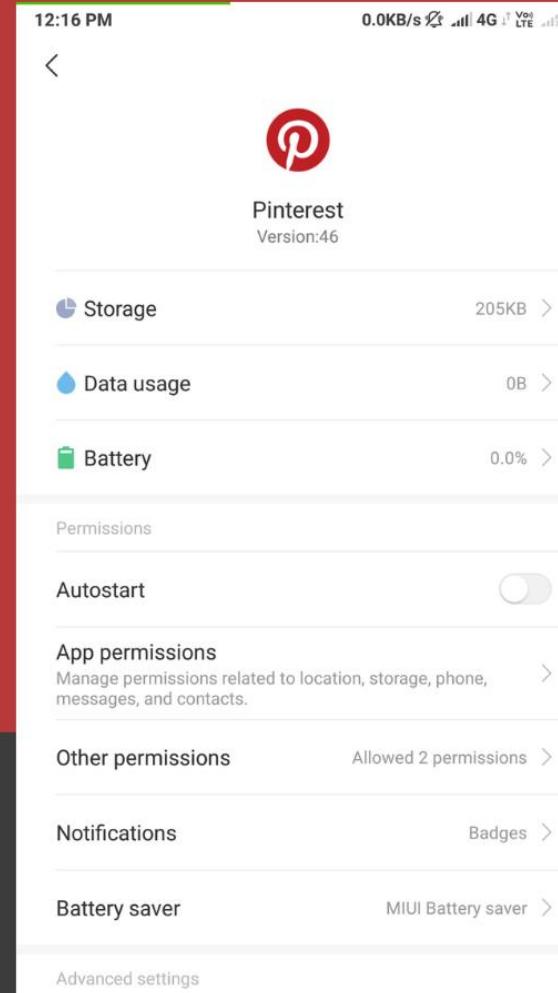
PhoneGap & Cordova

- ❖ But... Didn't PhoneGap/Cordova do this already?
No.
- ❖ PWA:
 - ❖ OS integration
 - ❖ Much smaller app size
 - ❖ Distribution

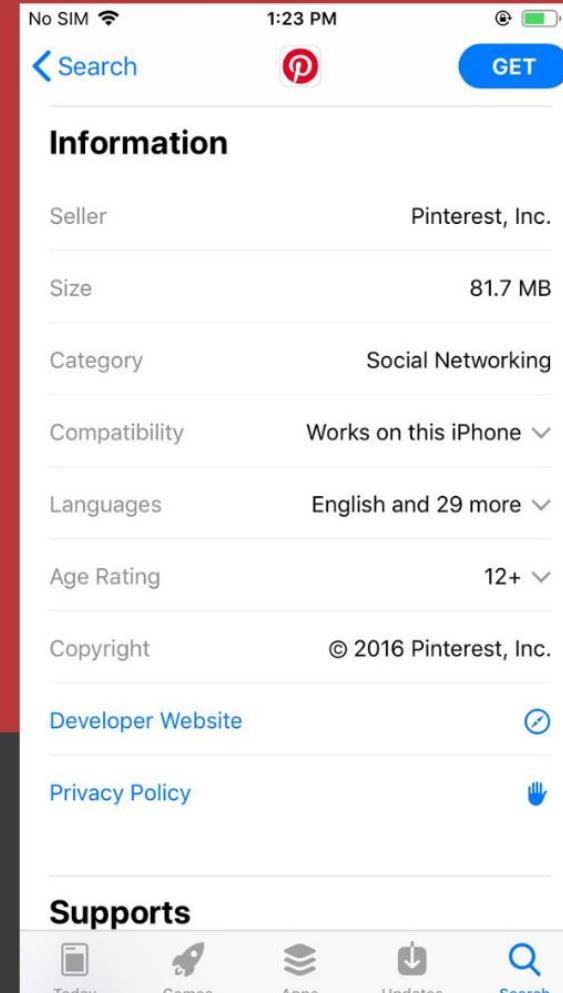
Why going PWA?



ANDROID



PWA



IOS

Source: <https://www.code-brew.com/blog/2019/03/01/everything-you-need-to-know-about-progressive-web-apps/>

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Case studies



As page load time goes from:

1s to 3s the probability of bounce **increases 32%**

1s to 5s the probability of bounce **increases 90%**

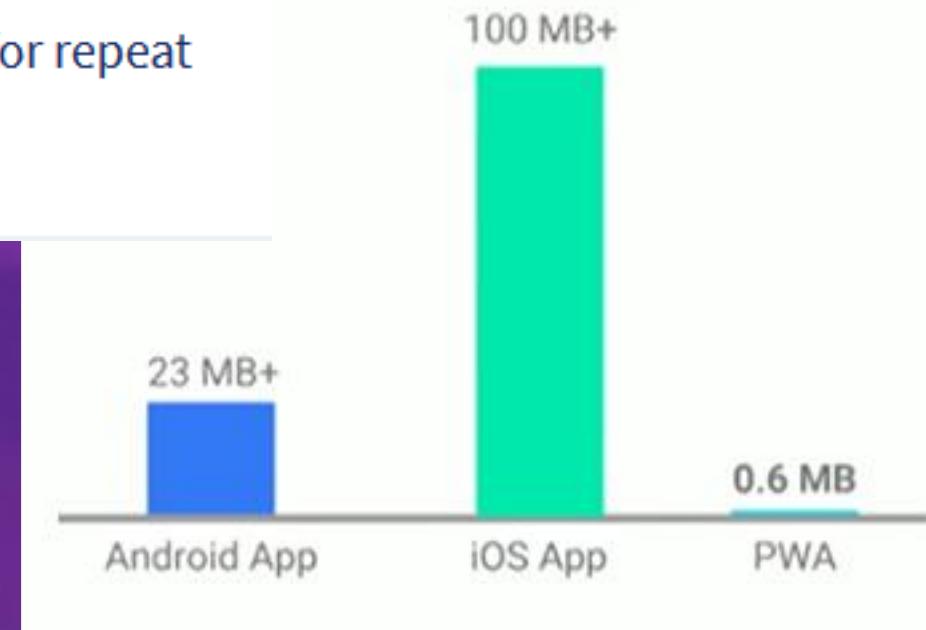
1s to 6s the probability of bounce **increases 106%**

1s to 10s the probability of bounce **increases 123%**

Source: Google/SOASTA Research, 2017.

Case studies

Twitter Lite saw a **65%** increase in pages per session, **75%** in Tweets, and a **20%** decrease in bounce rate. Twitter Lite loads in under **3** seconds for repeat visits even on slow networks.



Source: <https://www.pwastats.com/>

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Case studies

Forbes redesigned their mobile experience as a PWA resulting in **43%** increase in sessions per user, ad viewability up **20%**, and **100%** more engagement.

The **Forbes** Progressive Web App's homepage completely loads in just **0.8** seconds.

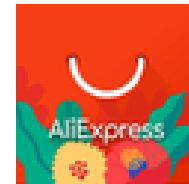


Case studies

Alibaba increased conversions on the mobile web by 76%, with 14% more monthly active users on iOS and 30% more on Android.



AliExpress improved conversion rate for new users by 104% across all browsers, with 2x more pages visited and 74% more time spent per session.



Case studies

Since launching their PWA, **Lancôme**'s mobile sales have increased **16%** year over year with overall speed increases of **50%**.



Lancôme's PWA features a **17%** increase in conversions, a **51%** increase in mobile sessions overall and a **53%** increase on iOS alone. Notifications contribute a **18%** open rate and a **12%** increase in recovered carts. **8%** of people responding to a notification make a purchase.

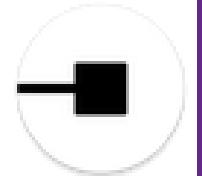


Case studies

Trivago saw an increase of **150%** for people who add its PWA to the home screen. Increased engagement led to a **97%** increase in clickouts to hotel offers. Users who go offline while browsing can continue to access the site and **67%** continue to browse the site when they come back online.



Uber's PWA was designed to be fast even on 2G. The core app is only **50k** gzipped and takes less than **3** seconds to load on 2G networks.



Case studies

Tinder cut load times from 11.91 seconds to **4.69 seconds** with their new PWA. The PWA is **90%** smaller than Tinder's native Android app. User engagement is up across the board on the PWA.



More advantages

- ❖ Progressive: every user, every device
- ❖ Migration should be easy
- ❖ A single team for a single product
- ❖ Win-win strategy

**How is
magic done?**

Setting up a PWA

- ❖ Move to HTTPS
- ❖ Use caching strategies (offline experience)
- ❖ Implement an app shell architecture (fast loading)
- ❖ Add a manifest.json (home screen)

Use caching strategies

- ❖ Need to cache common assets
- ❖ Dynamic content will still read from the net
- ❖ Dev decides how PWA will be cached
- ❖ Use Service Workers

Service Workers

- ❖ A JS script that runs on background
- ❖ Even when user is away
- ❖ Usages:
 - ❖ CacheStorage API
 - ❖ Push notifications
 - ❖ Bitcoin mining :-D
 - ❖ ...

Service Workers

❖ Installing a Service Worker

```
/* service worker */
if(location.protocol==='https:' && 'serviceWorker' in navigator){
  navigator.serviceWorker.register('my_service_worker.js');
}
```

Service Workers

- ❖ Google's basic CacheStorage example:

<https://github.com/googlechrome/samples/tree/gh-pages/service-worker/basic>

```
/*
  cache id, change to v2 when you update any of your
  local resources, it will trigger the install event again
*/
const PRECACHE_ID='my_site_cache-v1';

/* resources to be cached */
const PRECACHE_URLS = [
  'index.html',
  './',
  'styles.css',
  './../styles/main.css',
  'demo.js'
];

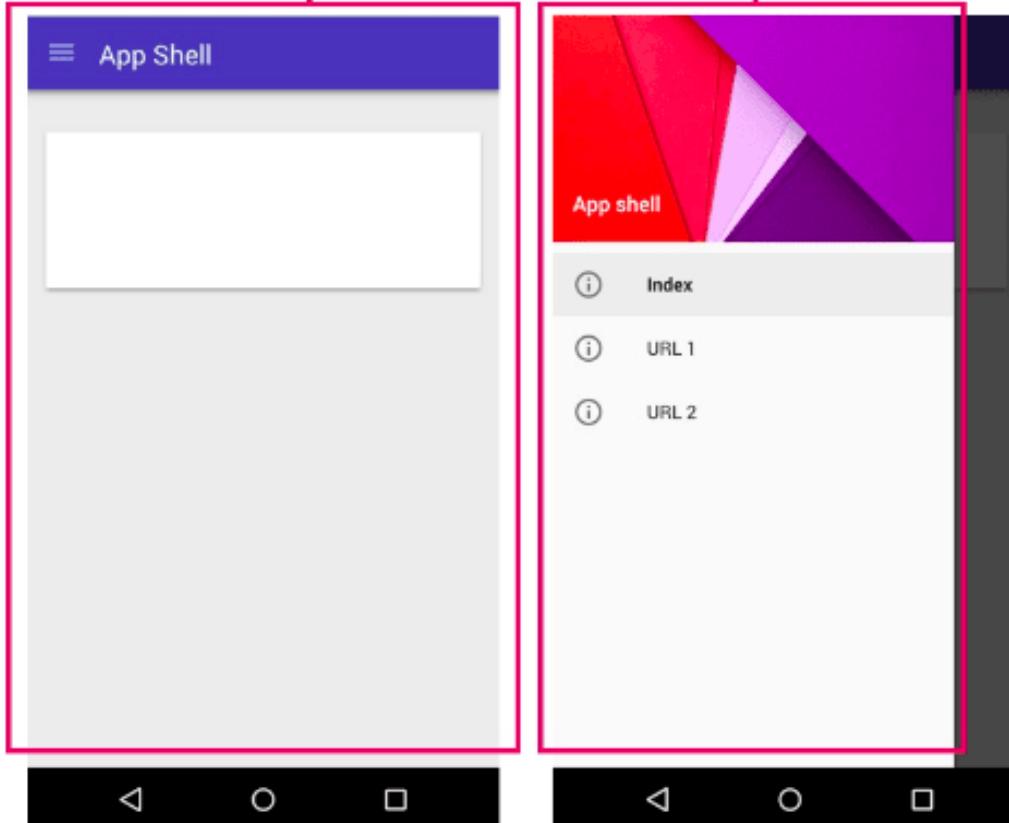
/* install event */
self.addEventListener('install', event => {
  event.waitUntil(
    caches.open(PRECACHE)
      .then(cache => cache.addAll(PRECACHE_URLS))
      .then(self.skipWaiting())
  );
});

/* activate event: cleans up old caches */
self.addEventListener('activate', event => {
```

App shell architecture

- ◆ App's shell: the required HTML, CSS and JS files that build the UI
- ◆ ...in other words: the UI skeleton
- ◆ They need to be cached to ensure performance and reliability

application shell



Cached shell loads **instantly** on repeat visits.

content



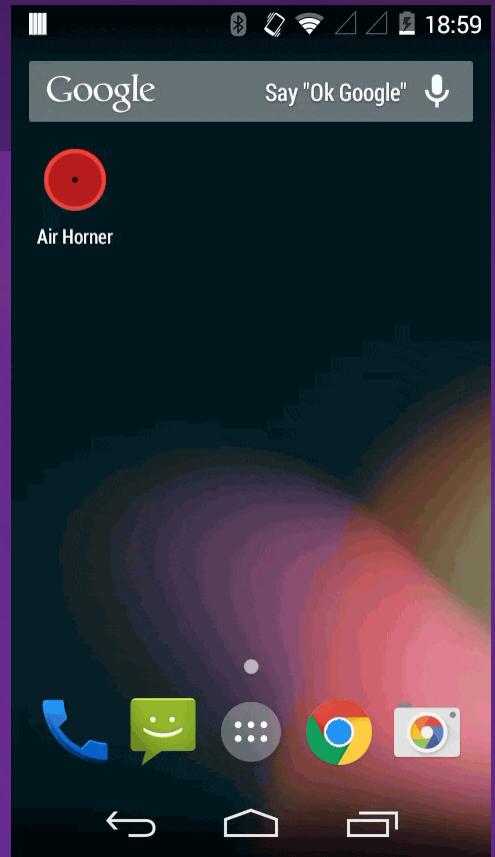
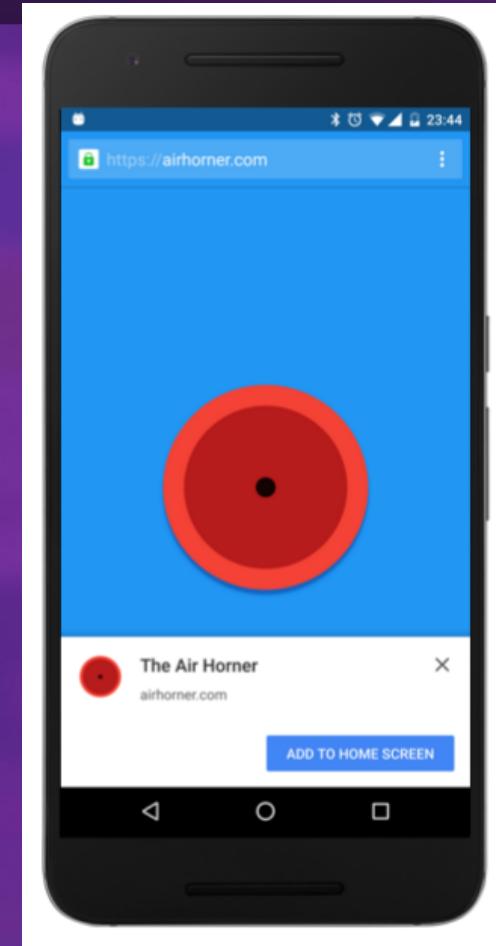
Dynamic content then
populates the view

App shell architecture advantages

- ◆ Minimum data downloading
- ◆ Dynamic content is loaded when needed
- ◆ Delivering UI updates is easy

manifest.json

- ❖ Final step: needed for Home screen integration
- ❖ Decides some aspects within OS integration
- ❖ <meta> tags replacement for non-Android devices



Source: <https://airhorner.com/>

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```
{  
  "name": "My awesome PWA!",  
  "short_name": "My PWA",  
  "icons": [  
    {  
      "src": "appicon192.png",  
      "sizes": "192x192",  
      "type": "image/png",  
      "density": "1.0"  
    }, {  
      /* ... */  
    }  
  ],  
  "start_url": "index.html",  
  "display": "standalone|browser",  
  "orientation": "portrait|landscape",  
  "theme_color": "#353d46",  
  "background_color": "#353d46"  
}
```

Our first PWA!

- ◆ Our site is now ready to be delivered as a PWA!
- ◆ Users should now get a popup when entering our site, encouraging them to install it as a PWA.
- ◆ Installation will be immediate
- ◆ Final user will feel it like a native app

**Tips &
tricks**

Useful APIs

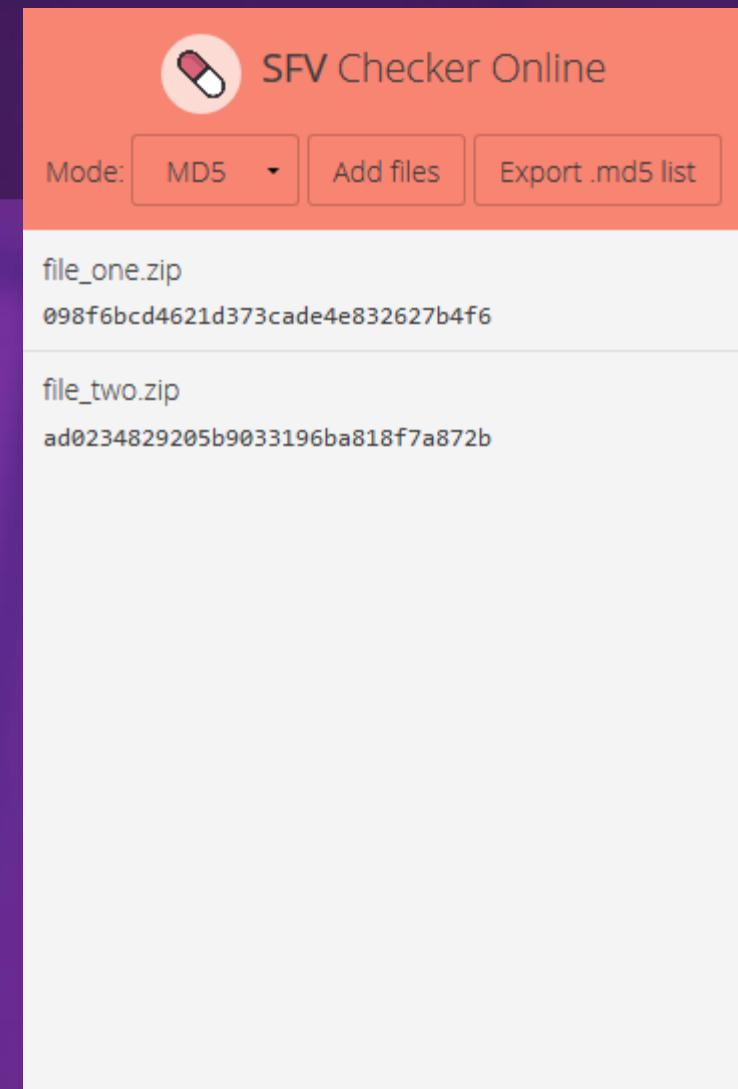
- ❖ PWA work under a web browser
- ❖ So they can use any of the available web browser APIs

Useful APIs

- ❖ Credential Management API
- ❖ Payment Request API
- ❖ Web Workers
- ❖ LocalStorage / IndexedDB
- ❖ Camera, gyroscopes...

Web Workers

- ❖ Background processes
- ❖ Useful for long math calculations



The screenshot shows the SFV Checker Online web application. At the top, there's a logo of a pink capsule inside a white circle, followed by the text "SFV Checker Online". Below the logo are three buttons: "Mode: MD5", "Add files", and "Export .md5 list". The main area displays two entries. The first entry is "file_one.zip" with the MD5 hash "098f6bcd4621d373cade4e832627b4f6". The second entry is "file_two.zip" with the MD5 hash "ad0234829205b9033196ba818f7a872b".

File	MD5 Hash
file_one.zip	098f6bcd4621d373cade4e832627b4f6
file_two.zip	ad0234829205b9033196ba818f7a872b

Example: <https://www.marcobledo.com/sfv-checker/>

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LocalStorage

- ❖ LocalStorage
 - ❖ Store small data (as JSON objects)
 - ❖ Useful to save user's settings
- ❖ IndexedDB
 - ❖ Store bigger data



Example: <https://www.marcobledo.com/minidex/>

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And of course...

- ❖ Your favorite framework and libraries
- ❖ Your devs are used to them, that doesn't even need to change

PWA in GitHub Pages

PWA in GitHub Pages

- ❖ GitHub Pages can be used to toy with PWA
- ❖ No dynamic content available, but still can get the most out of PWA
- ❖ A little advice: use absolute paths!

Q&A?

More info & references

- ❖ PWA: What, Why and How

<https://www.youtube.com/watch?v=eodArdGRIVQ>

- ❖ PWA are the next big thing

<https://workingmouse.com.au/app-development/progressive-web-apps-are-the-next-big-thing>

- ❖ Native apps vs. PWA

<https://medium.com/inside-smartapps/native-application-vs-progressive-web-app-which-one-should-you-choose-5eeaaf6ee92d>

Thank you all