



More than Web Apps, Progressive Web Apps!

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A little of history


- 2007 - Steve Jobs and iPhone in 2007
- 2013 - Firefox OS
- 2015 - Term coined by Alex Russell^[1]

[1] <https://medium.com/@slightlylate/progressive-apps-escaping-tabs-without-losing-our-soul-3b93a8561955>



What is a PWA?

- Appear to the user like a native app;
- They can work offline, but don't have to;
- Operating system agnostic;
- Compliant with web standards;



"Progressive Web Apps are
experiences that combine the best of
the web and the best of the apps"



PWA Characteristics

- Progressive
- Responsive
- Faster after initial loading
- App-like
- Fresh (Always up-to-date)
- Installable
- Safe (HTTPs only)
- Load while offline
- Linkable
- Connectivity independent



No More App Store

Use to Install

Not

Install to Use



PWA Support

	CHROME	SAFARI	EDGE	FIREFOX	OPERA
	MOBILE		DESKTOP		
	Android	iOS	Windows	macOS	Linux
PWA Progressive Web Apps	✓	✓	✓	✓	✓
Service Worker	✓	✗	✓	✓	✓
Web push notifications	✓	✗	✓	✓	✓
Offline browsing	✓	✗	✓	✓	✓
Background synchronization	✓	✗	✓	✓	✓
Add to home screen	✓	✗	Soon**	Soon**	..
App launching screen	✓	✗
Bluetooth	✓	✗	✗	✓	✗
Beacons*	✓	✗	✗	✓	✗
Geolocation	✓	✓	✓	✓	✓
Geofencing	✗	✗	✗	✗	✗
Image capture	✓	✓	✓	✓	✓
Video capture	✓	✓	✓	✓	✓

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Service Worker	..	✓	✗	✓	..
Web push notifications	..	✗	✗	✓	..
Offline browsing	..	✓	✗	✗	..
Background synchronization	..	✗	✗	✗	..
Add to home screen	..	Soon**
App launching screen	..	Soon**
Bluetooth	..	✗	✗	✗	..
Beacons	..	✗	✗	✗	..
Geolocation	..	✓	✗	✓	..
Geofencing	..	✗	✗	✗	..
Image capture	..	✓	✗	✓	..
Video capture	..	✓	✗	✓	..

<https://www.goodbarber.com/blog/progressive-web-apps-browser-support-compatibility-a883/>

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Use cases

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.



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.



Forbes' PWA test saw **2×** increase in average user session length, **6×** completion rate, and **20%** more impressions. Loads in **0.8s** down from 3 to 12s.



OLX experienced **250%** more re-engagement using push notifications and **146%** higher click-through rate on ads. The PWA takes **23%** less time to interactive resulting in **80%** lower bounce rates.



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.



Use cases

Pinterest rebuilt their mobile site as a PWA and core engagements increase by **60%**. They also saw a **44%** increase in user-generated ad revenue and time spent on the site has increased by **40%**.



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.



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.





Make your application a PWA


- HTTPS (or localhost)
- A Service Worker
- Web App Manifest
- The Web Api^[1]

[1] <http://webapi.link/>

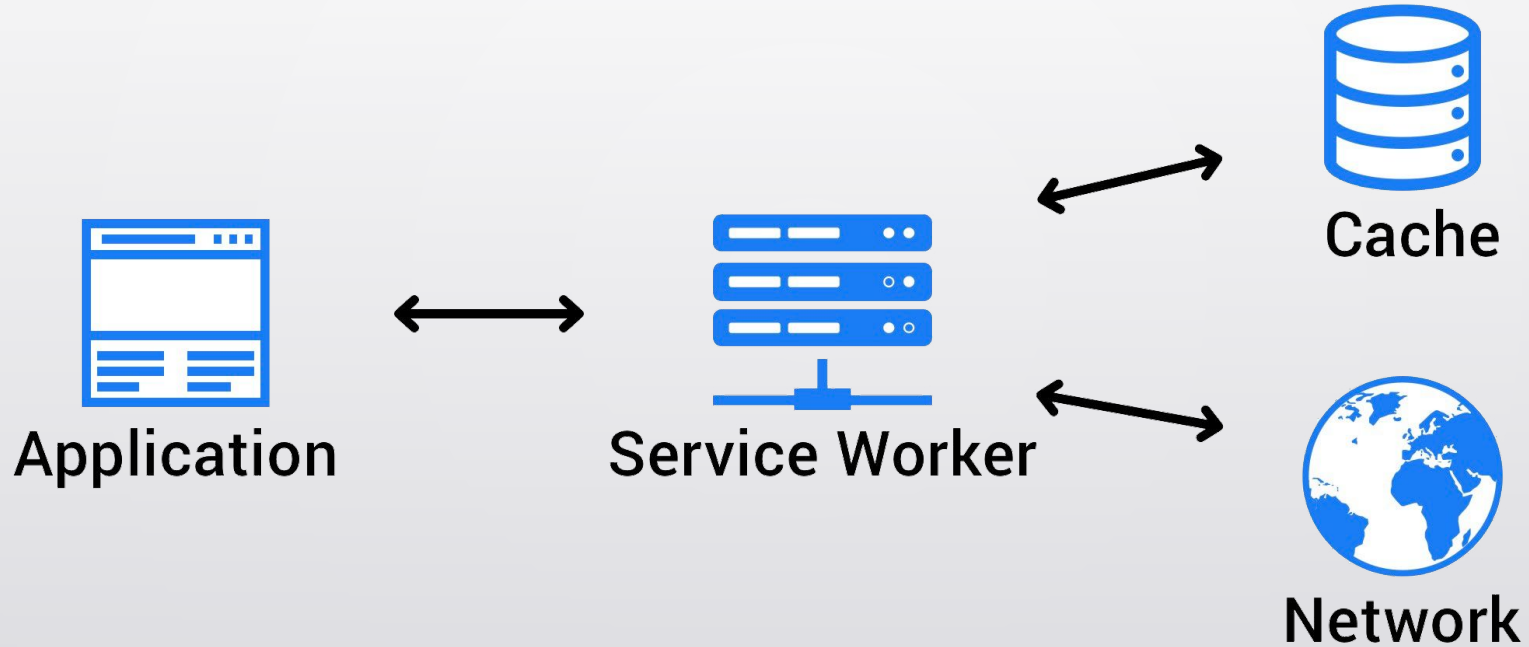
What is a Web App Manifest?

```
{
  "name": "Blue Bird",
  "short_name": "blue_bird",
  "theme_color": "#1e90ff",
  "background_color": "#ffffff",
  "display": "standalone",
  "scope": "/",
  "start_url": "/",
  "icons": [
    {
      "src": "icon-144x144.png",
      "type": "image/png",
      "sizes": "144x144"
    }
  ]
}
```

```
<link rel='manifest' href='manifest.json'>
```

Application <ul style="list-style-type: none">ManifestService WorkersClear storage	App Manifest manifest.json
Storage <ul style="list-style-type: none">Local StorageSession StorageIndexedDBWeb SQLCookies	Identity Name: Blue Bird Short name: blue_bird
Cache <ul style="list-style-type: none">Cache StorageApplication Cache	Presentation Start URL: / Theme color: #1e90ff Background color: #ffffff Orientation: Portrait Display: standalone
Background Services <ul style="list-style-type: none">Background FetchBackground SyncNotificationsPush Messaging	Icons 144x144 image/png 
Frames <ul style="list-style-type: none">top	

Service Worker

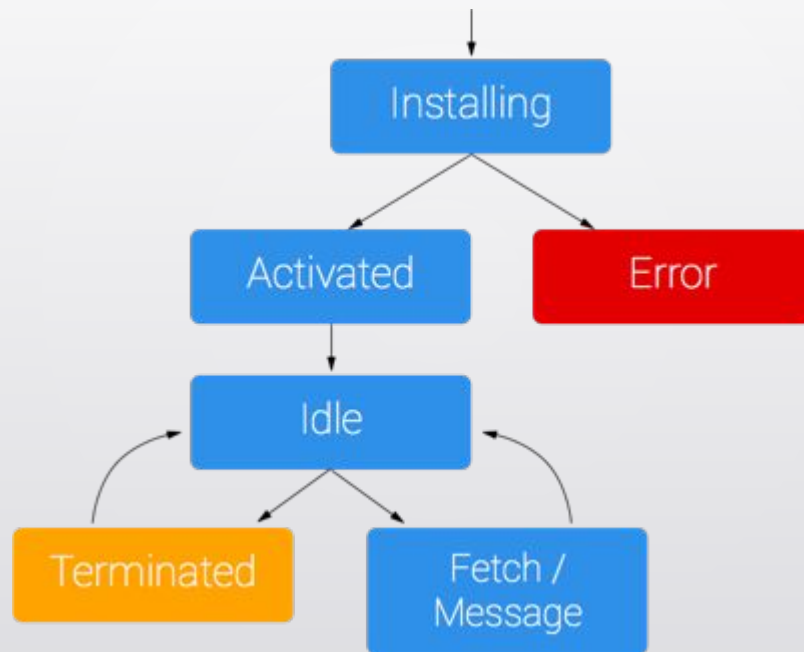




Service Worker

It's essentially a JavaScript file that runs separately from the main browser thread, intercepting network requests, caching or retrieving resources from the cache, and delivering push messages.

Service Worker



Blue Bird - Example



Blue Bird - Problems

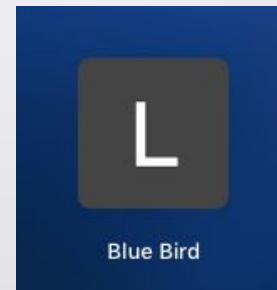


No internet

Try:

- Checking the network cables, modem, and router
- Reconnecting to Wi-Fi

ERR_INTERNET_DISCONNECTED



Service Worker - Register

```
<script>
  if ("serviceWorker" in navigator) {
    window.addEventListener("load", () => {
      navigator.serviceWorker.register("sw.js", { scope: "." })
        .then((registration) => {
          console.log("ServiceWorker registration successful");
        }).catch((err) => {
          console.log("ServiceWorker registration failed:", err);
        });
    });
  }
</script>
```

Service Worker - Install

```
const version = 'v1.0.0';
const urlsToCache = ['/', '/icon-144x144.png', '/blue-bird.js'];
const staticCacheName = 'blue-bird-' + version;

self.addEventListener('install', function(event) {
  event.waitUntil(
    caches.open(staticCacheName).then((cache) => {
      return cache.addAll(urlsToCache);
    })
  );
});
```

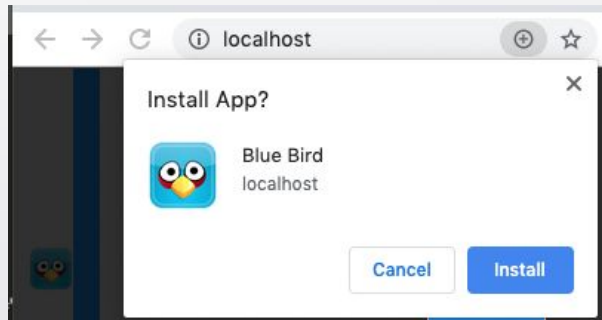
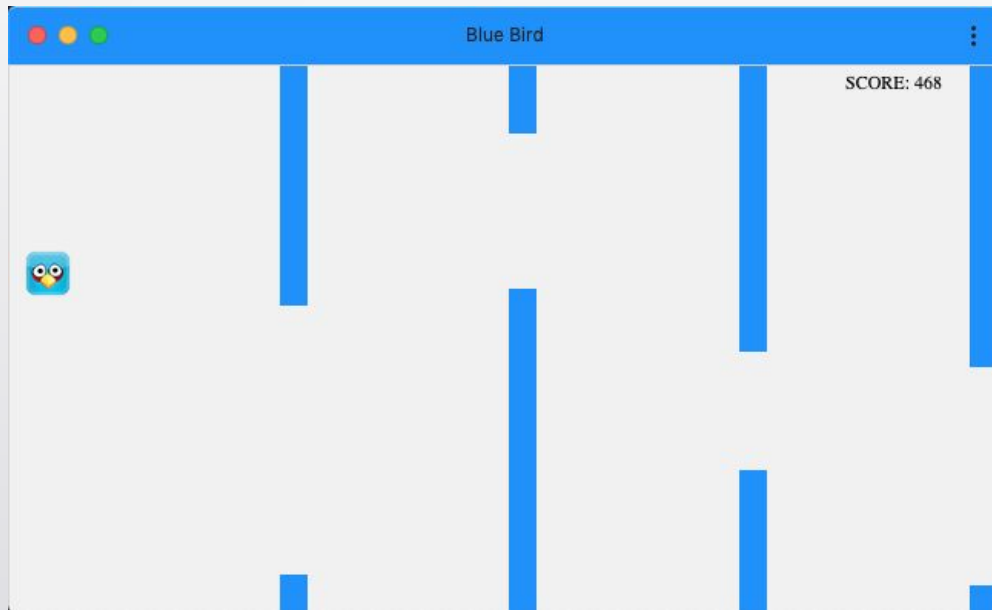
Service Worker - Activate

```
self.addEventListener('activate', event => {
  event.waitUntil(
    caches.keys().then(cacheNames => {
      return Promise.all(
        cacheNames
          .filter(cacheName => (cacheName.startsWith('blue-bird-')))
          .filter(cacheName => (cacheName !== staticCacheName))
          .map(cacheName => caches.delete(cacheName))
      );
    })
  );
});
```

Service Worker - Fetch

```
self.addEventListener("fetch", event => {  
  event.respondWith(  
    caches.match(event.request)  
      .then(response => {  
        return response || fetch(event.request);  
      })  
      .catch(() => {  
        return caches.match('/');  
      })  
  )  
});
```


Blue Bird



PWA - Workbox



Workbox is a set of libraries and Node modules that make it easy to cache assets and take full advantage of features used to build Progressive Web Apps.

- Precaching
- Runtime caching
- Strategies
- Request routing
- Background sync
- Helpful debugging


Performance - Web Workers

```
// index.js
const worker = new Worker("worker.js");

worker.onmessage = function(e) {
  console.log("Message received from worker", e.data);
};

worker.postMessage([10, 100]);
```

```
// worker.js
onmessage = function(e) {
  console.log("Worker: Message received from main script");
  let result = e.data[0] * e.data[1];
  if (isNaN(result)) {
    postMessage("Please write two numbers");
    return;
  }
  console.log("Worker: Posting message back to main script");
  postMessage("Result: " + result);
};
```



Performance - Webassembly

WebAssembly (often shortened to Wasm) is an open standard that defines a portable binary code format for executable programs, and a corresponding textual assembly language, as well as interfaces for facilitating interactions between such programs and their host environment.



Performance - Webassembly

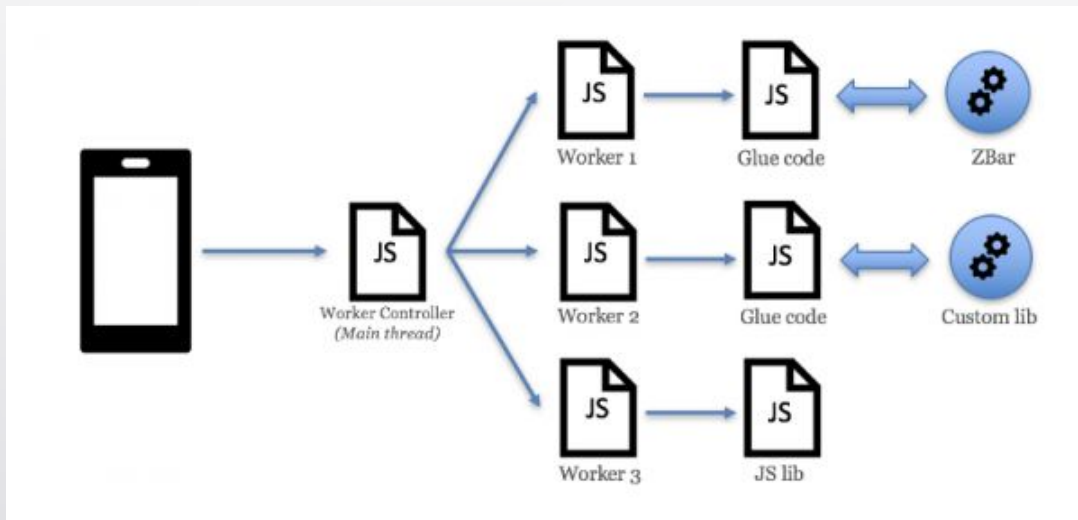
- Efficient and fast;
- Safe (memory-safe, sandboxed);
- Open and debuggable;
- Part of the open web platform;

Performance - Webassembly - Ebay

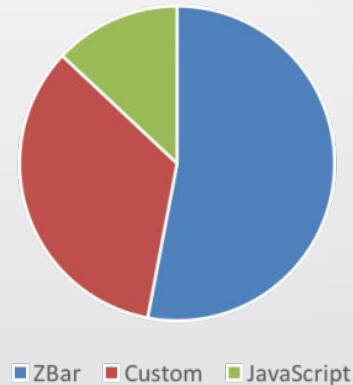


- Js BarcodeReader: 20% assertiveness (1 FPS)
- Ebay C++ Custom library: 60% assertiveness (50 FPS)
- ZBar: 80% assertiveness (15 FPS)

Performance - Webassembly - Ebay



Scanner contribution by type



Result: \approx 100% assertiveness

Publish PWA on play store



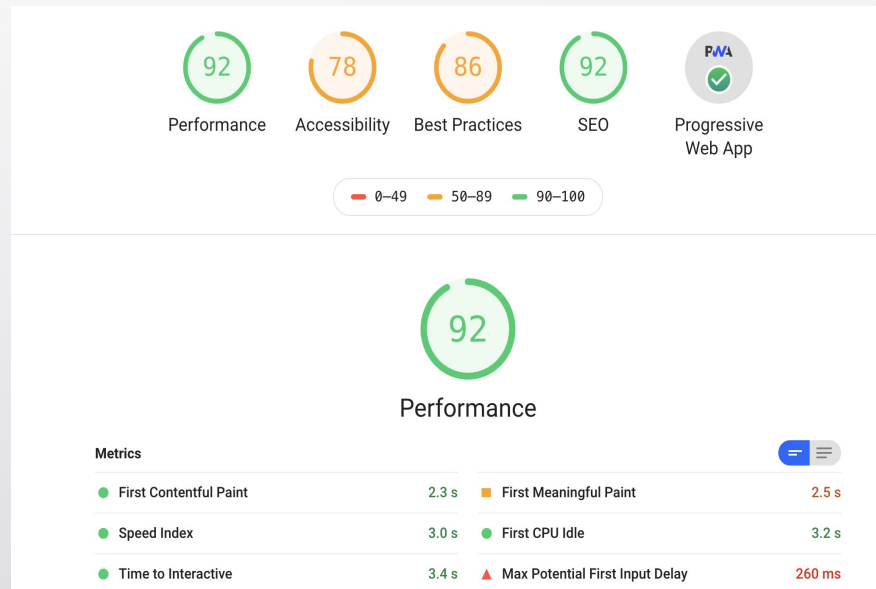
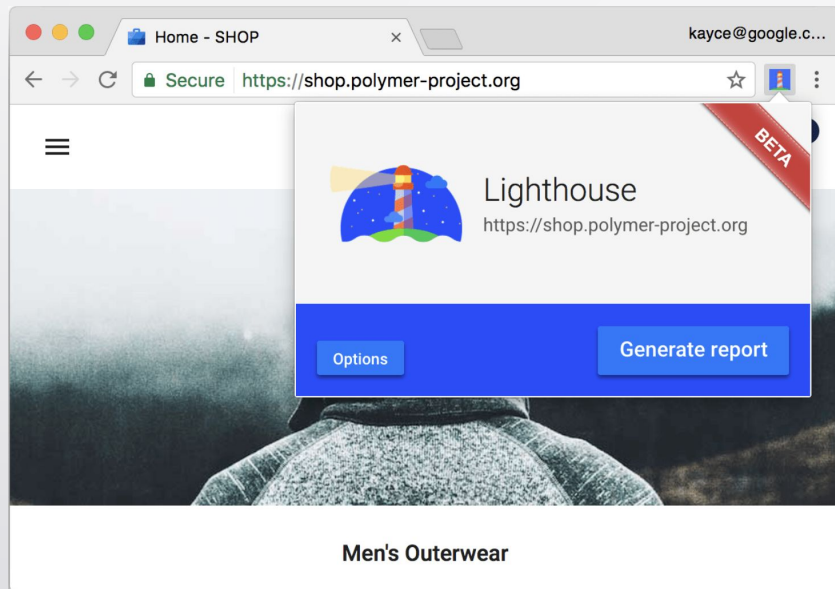
- Trusted Web Activity (TWA) - Chrome 72 for Android
- PWA will still be rendered with the installed Chrome version, sharing all storage, cache, and sessions with the browser.



Google Checklist

- Site is served over HTTPS;
- Pages are responsive on tablets & mobile devices;
- All app URLs load while offline
- Metadata provided for Add to Home screen
- Site works cross-browser
- and more..

Lighthouse



Questions





More than Web Apps, Progressive Web Apps!



github.com/meneguete



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