ionic whitepaper

The Architect's Guide to PWAs

How PWAs can boost your app strategy by harnessing the power of the web - and what you need to know to get started today.

Progressive Web Apps (PWAs) take advantage of major advances in modern web browsers, web APIs, and front-end frameworks to deliver great app experiences to mobile and desktop users. Big brands like Twitter and Pinterest are demonstrating how PWAs can boost user acquisition, engagement, and ultimately, revenue.

But PWAs are not a silver-bullet. They work best as part of a broader app strategy that focuses on creating a consistent, high-quality user experience across all the channels that your users want to engage with you.

This brief guide provides enterprise architects and app dev leaders with essential insights on which projects are right for PWAs, and how to build a production-ready PWA today.

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Why PWAs Matter

The world of applications is highly competitive and increasingly crowded. In just the last few years, the number of app store apps more than doubled, to more than 2 million (Lifewire). The impact of this is twofold: app fatigue for users, and immense pressure for application developers and enterprise architects to make sure their apps stand out from the crowd and provide the absolute best user experience. An app that takes more than a few seconds to load, or more than a few clicks to find and download from an app store can cost you that user.

On the positive side, an app that delivers great content seamlessly and quickly, no matter what device a user has, can set your company apart. This is why Progressive Web Apps (PWAs) are quickly becoming the standard way to ship these great user experiences to the web. In fact, Gartner predicts that by 2020, 50% of general-purpose, consumer-facing mobile apps will be PWAs.

But what are PWAs, exactly, and how do you make them work for you? In this guide you'll get to know PWAs, complete with statistics and real-life examples, to answer the questions of why you need one, how they work, and how you can get started.

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What are PWAs?

PWAs take advantage of the latest web standards and APIs to provide the reliable, fast, and engaging experience that people expect from modern apps. Because they're web-based, they inherently deliver all the best parts of the web, including an extremely wide reach, instant access, instant updates, and easy shareability.

Compared to traditional mobile web apps, PWAs look and feel much more like a native app – in fact, they're often indistinguishable from their native counterparts. They include offline storage and access to native features like push notifications, geolocation, and the camera – all delivered instantly through the web browser. Unlike traditional native apps, though, users don't need to be routed through the app store. PWAs are also usually much smaller in size than native apps, so they load faster, work better over low-bandwidth networks, and take up less space on a user's device.

Progressive Web Apps are a new way to offer incredible mobile app experiences that are highly optimized, reliable, and accessible completely on the web. Here are some of the critical capabilities that set PWAs apart from traditional web apps.

RELIABLE
Work offline and perform well on low-quality networks.

FAST
Load in seconds, with smooth interactions inside the app.

ENGAGING
Immersive app experience with full access to native features.

DISCOVERABLE
Easily discovered through a simple web search.

SMALL
A fraction of the size of a traditional app store app.

FRESH
Always up-to-date with the latest content served instantly.

INSTALLABLE
Allow users to "keep" apps they find useful on their home screen.

ACCESSIBLE
Run on desktop and mobile, or anywhere you find a browser.

The facts

Don't take our word for it. An expansive Doubleclick by Google user study found that:

- **53% of users will abandon a site** if it does not load within 3 seconds on a mobile device
- **Sites that loaded within 5 seconds** earned twice as much ad revenue as slower sites
- **Most sites take about 19 seconds** to load on a 3G network

The takeaway: Those that can provide a fast, user-friendly experience don't just set themselves apart with happier users, they actually see increased revenues. This is where PWAs separate your company from the crowd.

Perhaps you prefer real-life examples over research? Two companies you might have heard of implemented PWAs and saw impressive results.

Pinterest saw user engagement increase by 60%, helping to drive a 44% increase in user-generated ad revenue. These increases also represented a 2-3% bump over Pinterest's native app.

Twitter's PWA provides the exact same user experience as the native twitter app, while using less than 3% of the device storage. This combination of a better, faster, more efficient product has been a hit with users, to the tune of a 20% decrease in bounce rate and a 75% increase in tweets sent.

The takeaway: Whatever your industry or brand, PWAs can provide higher user engagement, lower bounce rates, and ultimately more revenue by providing a better experience for your users.

How PWAs fit into your app strategy

Let’s get one thing out of the way: PWAs vs. native apps isn’t a winner-take-all battle. PWAs should be part of a broader app strategy focused on creating a consistent, seamless, high-quality experience across all channels, whether it’s a mobile browser, a native mobile app, a desktop browser, or a native desktop app.

In general, PWAs are great for attracting new users, while natively installed apps can be better for delivering the richest experience to loyal, repeat users. Each has its advantages and disadvantages, though, so it’s important to ask some questions about your brand.

Where does your user base come from?

If most of your user base already comes from the web then a PWA is a natural fit for your product. Likewise, if you want to increase the amount of users that come from the web, then providing an upgraded web experience with a PWA can be a great enticer.

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Do you have a high bounce rate?

If you are looking to reduce bounce rate, then the instant experience that a PWA provides can help. By reducing the amount of steps it takes to get into your experience – moving from going to the app or play store, searching for your app, and installing your app, to just clicking a link – you can drastically reduce churn and bounce rate.

Do you have unusual technical requirements?

While the web is becoming more powerful every day, there are still a few things, like fingerprint authorization, that are not yet available. Therefore, the most common case where a PWA might not be a great fit is for products that have a technical requirement that is only available on native platforms. Even in those cases, however, it’s worth considering adding a PWA to improve the user experience for new visitors, and then routing them to the app stores once they want to access more advanced functionality.

Are you building a B2E app for company employees?

For teams building business-to-employee (B2E) apps, distribution and data privacy can be a challenge, and often require a mobile device management (MDM) solution. Since PWAs are browser based, robust application management activities like whitelisting, app wrapping, and DLP required with a native app don’t come into play. On the distribution front, there’s no need to deploy PWAs to an app store, employees can simply download them directly from your website when they need them. And information is stored away from the device, at the browser level, easing data privacy concerns (Forrester Research).

Desktop support for PWAs

PWAs have broad support across mobile (including iOS support soon), and they're also beginning to be supported in desktop platforms like Chrome OS and Windows 10.

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Microsoft recently announced its intent to make PWAs a first class citizen on Windows 10. It will allow them to be installed directly from the Microsoft Store, show up in the start menu and apps list alongside native apps, and open in a separate window just like a normal Windows app.

Google also recently started improving the PWA experience in Chrome OS. When a user visits a PWA on their Chromebook they will be prompted to add that PWA to their device, just like on Android. Once added, that PWA will show up in the app drawer and open in a separate window.

What does all this mean for you? You can now ship one PWA and have it work just as well for users on a desktop as it does on mobile and tablets.

PWAs UTILIZE NEW, MODERN WEB APIS, MOST CRUCIALLY SERVICE WORKERS AND A WEB APP MANIFEST.

How PWAs work

PWAs utilize new, modern web APIs, most crucially Service Workers and a Web App Manifest. While these two APIs are relatively new, they already have full support in Chrome (and Chrome-based browsers such as Samsung Internet) and Firefox, and support in beta for Safari and Edge. These APIs make it possible to ship a full featured app experience that hasn’t been possible on the web up to now.

Service Workers

Service Workers are the biggest player, helping your PWA reach those reliable, fast, and engaging benchmarks. Service Workers allow your PWA to work offline – not traditionally possible on the web – load reliably no matter the state of the user’s network connection, and enable features like push notifications and background data syncing.

Service Workers also give you fine-grained control over caching through JavaScript APIs, letting you create a custom offline experience tailored for your app. For example, you can program your service worker to always serve cached content first, keeping your app nice and fast, but then to update the cache in the background so the next time the user opens your PWA the content will be up to date.

Web App Manifests

Web App Manifests allow your PWA to deliver the look and feel people expect. They let you specify an icon, app name, and splash screen color, and enable users to install your PWA to their device and have it appear right alongside their native apps.

More information

Check out these articles to get more info on Service Workers and Web App Manifests:

- Service Workers: an Introduction
- ServiceWorker Cookbook
- The Web App Manifest

With a solid understanding of these APIs, you're ready to move on to the next step: building your first PWA.

How to get started

There are a lot of helpful resources to help you build a PWA. Here are a couple to get you started:

- Google offers an excellent code lab that uses vanilla JS to review the key concepts of PWAs by building a simple weather PWA
- If you're more of a visual learner, the 2017 Chrome Dev Summit had a great talk about the basic principles to keep in mind when building your first PWA

When you're ready to build a real, production-ready PWA, consider the Ionic PWA Toolkit.

The Ionic PWA Toolkit

Listen, despite all their great advantages, building a fast, engaging, great PWA is very challenging when you're trying to use traditional web tooling. Our goal with the Ionic PWA Toolkit was to remove this complexity.

It starts with making all PWA best practices the default setting, with no config required. So, all those features that are essential to delivering a great experience – optimizing bundle size, lazy loading, code splitting, etc. – are there to start, not difficult-to-implement improvements you have to code in. This all means that your app will only load exactly the JavaScript an individual page needs, ensuring that your PWA can achieve that all-important 3-5 second load time on the average network.

The Ionic PWA Toolkit also provides our recommended setup for building production ready PWAs with Ionic, including the open source Stencil (an open source project from the Ionic team) for your app logic and the open source Ionic Framework for your user interface.

THE IONIC PWA TOOLKIT ALSO PROVIDES OUR RECOMMENDED SETUP FOR BUILDING PRODUCTION READY PWAS WITH IONIC.

Stencil utilizes the latest standards, such as web components, ES modules, ES dynamic imports, and more, to make sure your apps deliver a great experience built on a modern, reliable tech stack.

Using Ionic Framework for your UI components ensures that your PWA has the modern look and feel that customers expect. Our components utilize material design when running on an Android or desktop device and iOS design when running on an iOS device, guaranteeing the user will be familiar with your UI. We also utilize the latest best practices to ensure that all your animations will be smooth and fast, even on lower end devices.

To learn more about the Ionic PWA Toolkit and whether it can help your business, check out some of our resources:

- User forum
- Quick start instructions
- Guides, videos, and e-books
- Developer docs
- Ionic PWA Toolkit

About Ionic

Ionic makes it easy to build high-performance mobile and Progressive Web Apps that look and feel beautiful on any platform or device. The Ionic Framework is the #1 adopted cross-platform development framework in the world, with a vibrant community of more than 5 million developers in over 200 countries.

Let Us Help With Your PWA Strategy

Our app strategists are available to provide customized recommendations on when and how PWAs can help simplify development and jumpstart user acquisition and engagement.

Let's Talk Strategy