

# PWA

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# Goals

- Understand what a PWA is
- Understand what you need to make a website into PWA
- Know the pros and cons of PWAs
- Know what tools can help you

# Progressive Web Apps

- Existing web site
- No hybrid applications
- Easy installation
- Faster service
- Native device features
- Updates without Store
- Discoverability

Concepts

Manifest

Service  
Worker

Caching

Storage

Tools

Platforms

Tips

# You only need 3 things

- HTTPS
- Web App Manifest
- Service Worker

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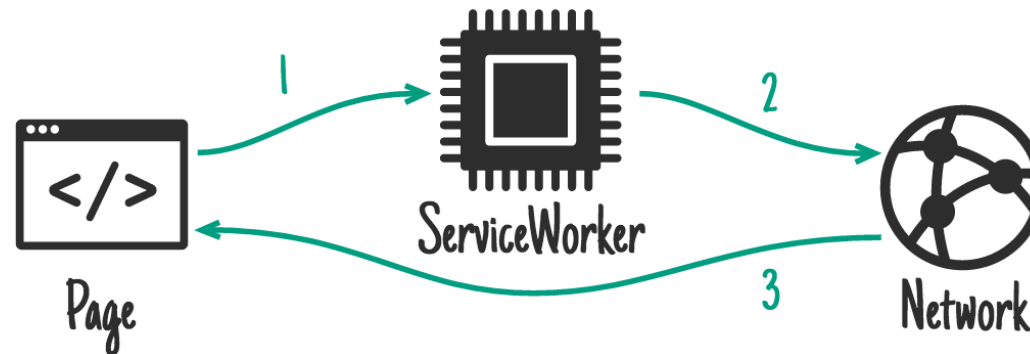
Tips

# Web App Manifest

- Metadata of your application
- `<link rel="manifest" href="/manifest.json">`
- Properties
  - short\_name and/or name
  - icons
  - start\_url
  - background\_color
  - theme\_color
  - display
  - orientation
  - scope

# Service Worker

- Separate script from web
- Runs in background
- Interferes requests



# Service Worker

- Caching
- Background sync
- Push notifications
- Cannot access DOM
- Reacts to events
- You need HTTPS

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# Service Worker registration

- Check if service worker is supported

```
if ('serviceWorker' in navigator)
```

- Register

```
navigator.serviceWorker.register('service-worker.js');
```

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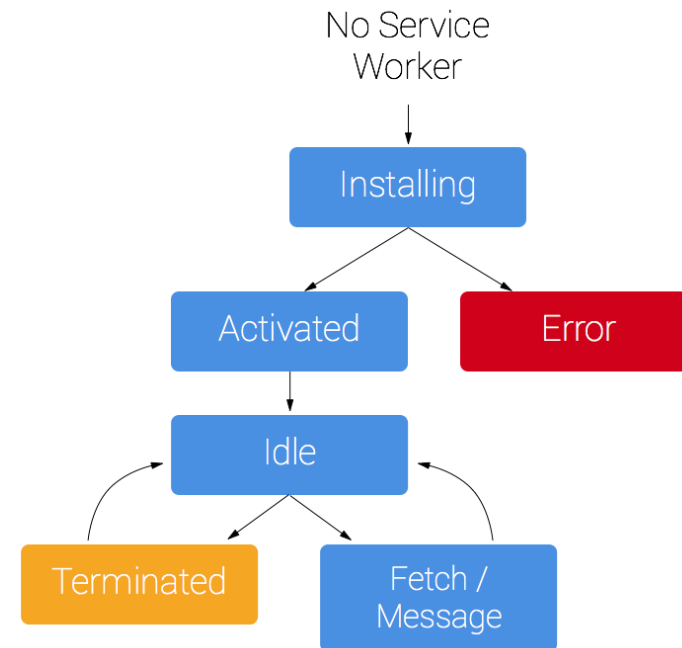
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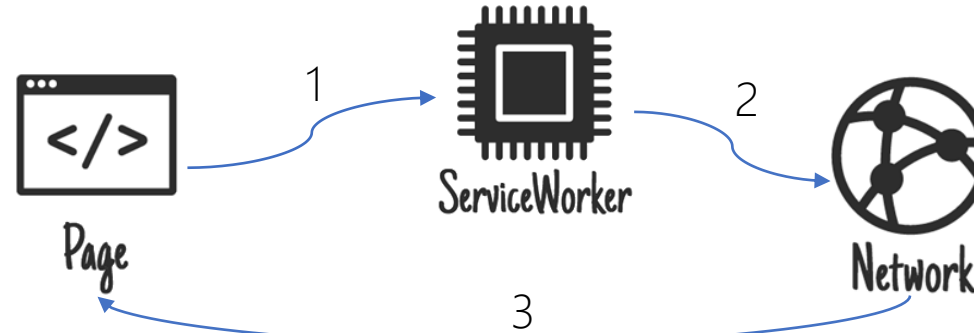
# Service Worker Lifecycle

- Installing
  - Cache static assets
- Activated
  - Manage old caches
- Idle
- Fetch/Message
  - Process request

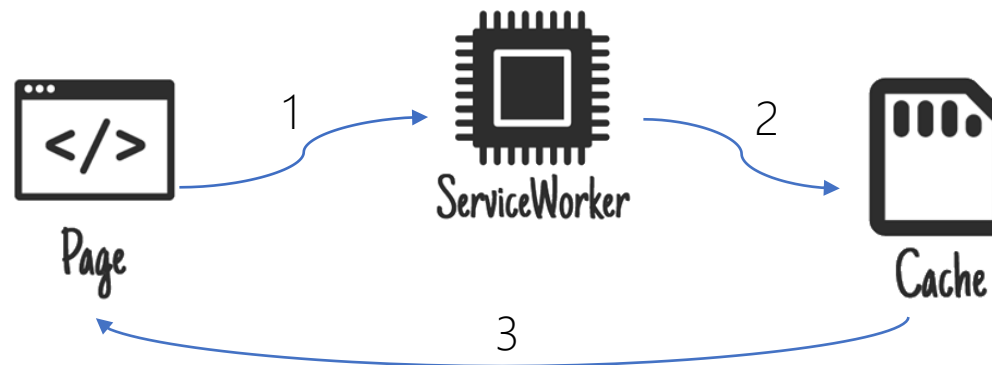


# Caching strategies

## Network Only

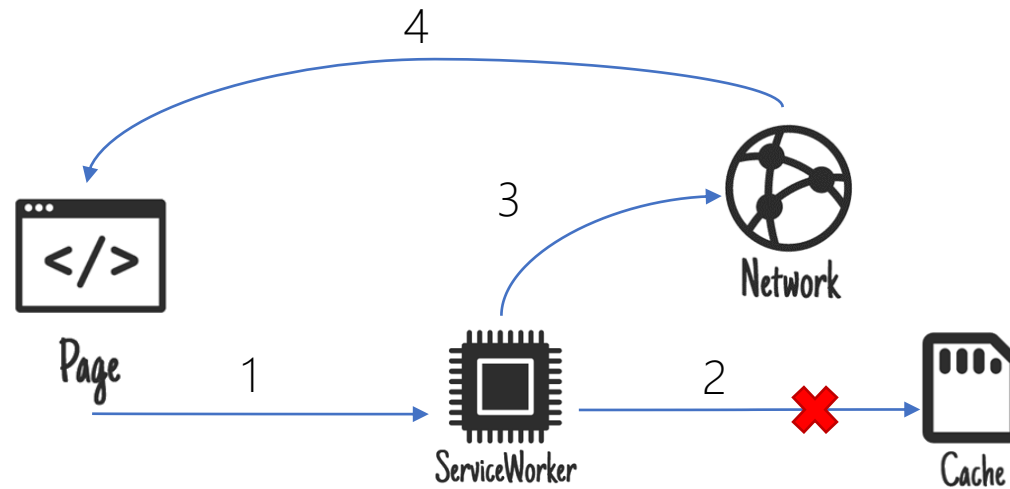
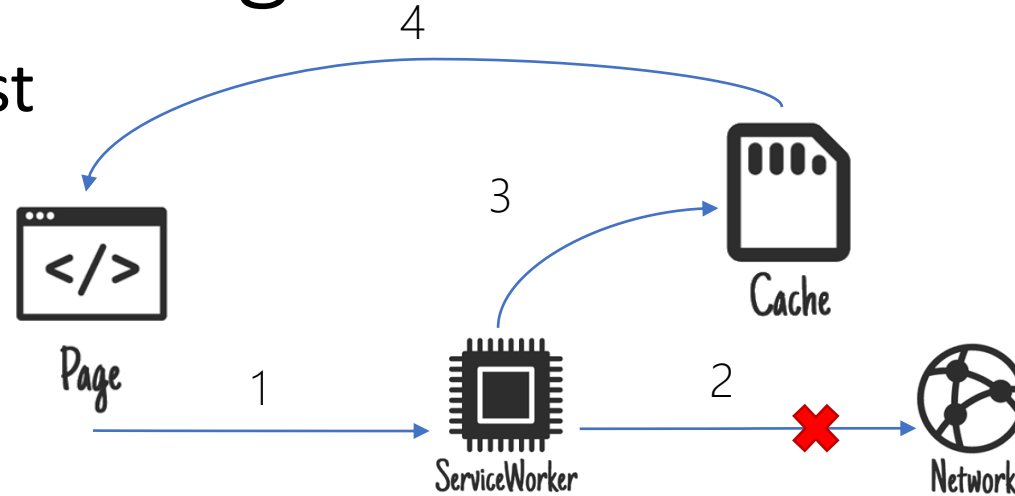


## Cache Only



# Caching strategies

Network First



Cache First

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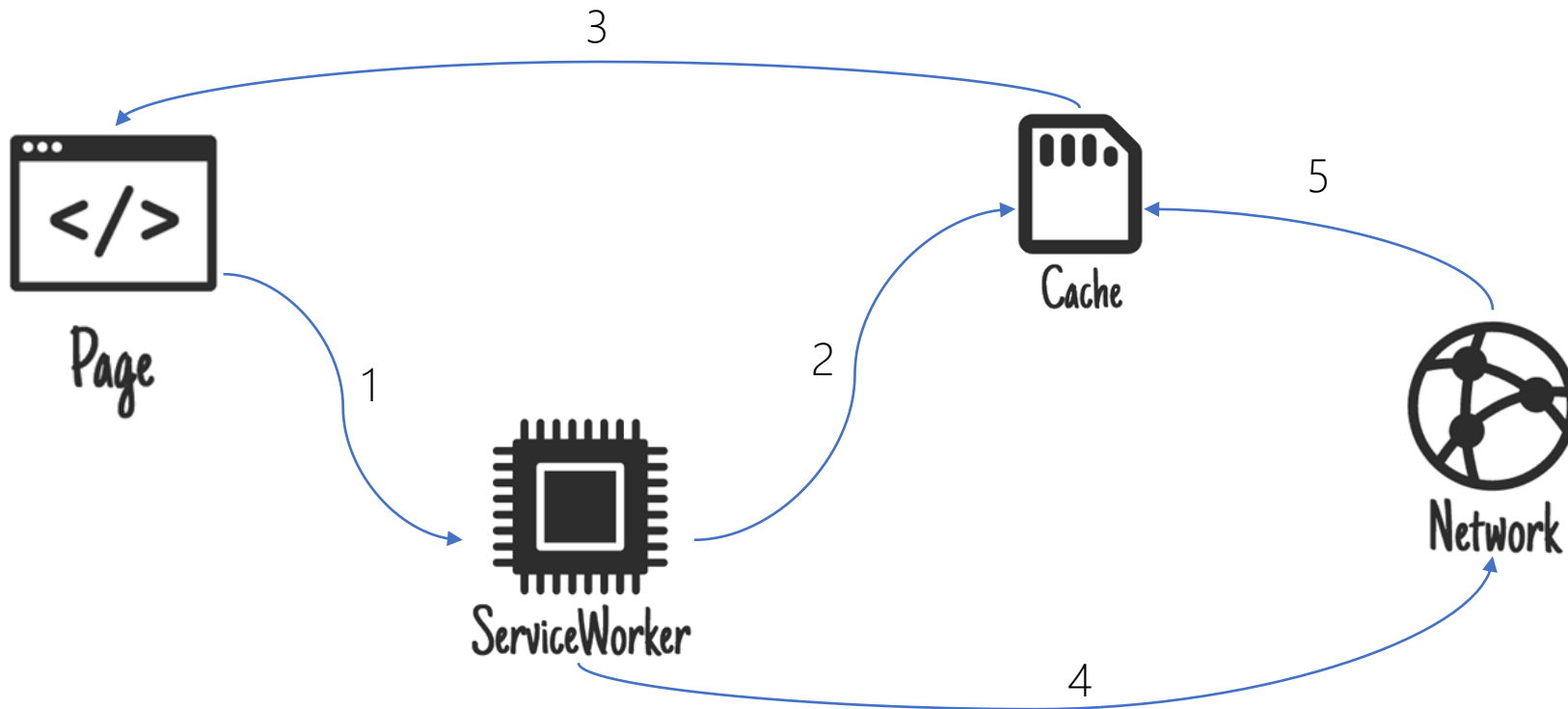
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# Caching Strategies

## Stale-While-Revalidate



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# PWA Sample

Demo

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# Local storage

- No expiration date
- Key-value storage for strings
- About 5MB limit
  
- Not accessible from service worker

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# SQLite

- We are still on the client
- Where do we store the .db file?
- Native File System to the rescue?

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# IndexedDB

- Size limit – depends on browser – but is in 10s or 100s of MBs
- Also accessible from service worker
- More complex than LocalStorage
  - Need to take care of updating schema of database on client
  - But enables more advanced scenarios
- Dexie.js – nice library for working with IndexedDb

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# Sync When Online

- Detect when the web goes online/offline
  - JavaScript - navigator.online
- Sync local data with server
  - Logic depends on application

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# JavaScript Interoperability

- [JSInvokable] attribute – enable calling of method from JavaScript
  - In JavaScript - `interop.invokeMethodAsync()`
    - 1<sup>st</sup> parameter – name of method
    - Other parameters – method parameters
- IJSRuntime – run JavaScript from C# code
  - `InvokeVoidAsync()` – no return value expected
  - `InvokeAsync<>()` – return value expected

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# Data Storage

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# Chrome Developer Tools

- Application
  - Manifest
  - Service Workers
  - Storage
- Audits
  - Progressive Web App
- Remote Target

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# PWA builder

- Check your PWA capabilities
- Add a prepared service worker
- Add features
- Generate – Android, Windows, iOS, Meta Quest
- VS Code extension
- <https://www.pwabuilder.com/>

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# Android App

- **Option 1:** Download a pre-built package from PWA builder
- **Option 2:** Create a project in Android Studio
- **Option 3:** Download a ready-made TWA Android Studio project and modify URLs and images: <https://github.com/AJONPLLC/com-ajonp-app> (how to use: <https://www.youtube.com/watch?v=db9Y5jyparA>)

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# Trusted Web Activities – TWA

- Android only
  - The app and web are from the same developer
  - Digital Asset Links file
  - Rendered in user's browser
  - Fullscreen
- 
- <https://developers.google.com/web/updates/2019/02/using-twa>

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# iOS App

- From browser
  - Add custom install prompt
  - Supported
- App Store:
  - Cordova

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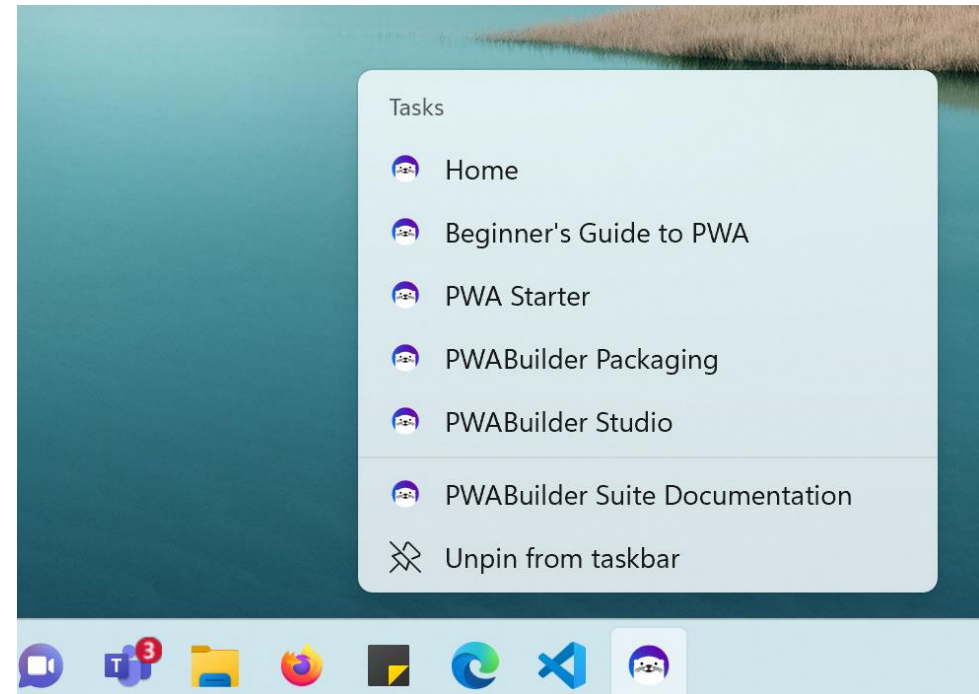
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# Native Features

- Shortcuts



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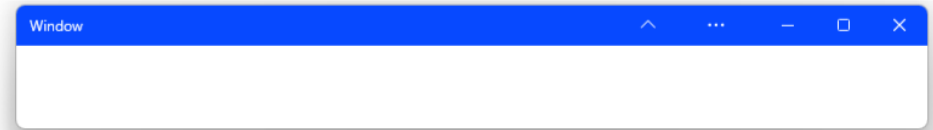
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# Native Features

- Shortcuts
- Window Controls Overlay



WCO disabled



WCO enabled

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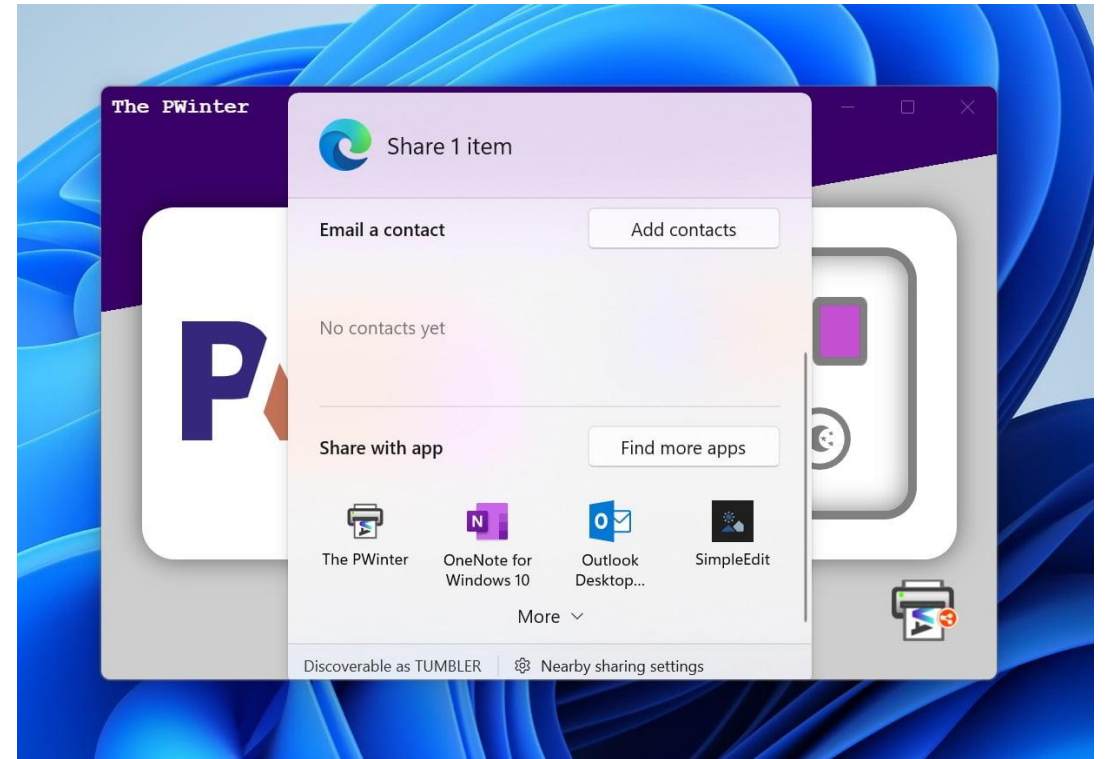
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# Native Features

- Shortcuts
- Window Controls Overlay
- Web Share API



# Native Features

- Shortcuts
- Window Controls Overlay
- Web Share API
- Badging



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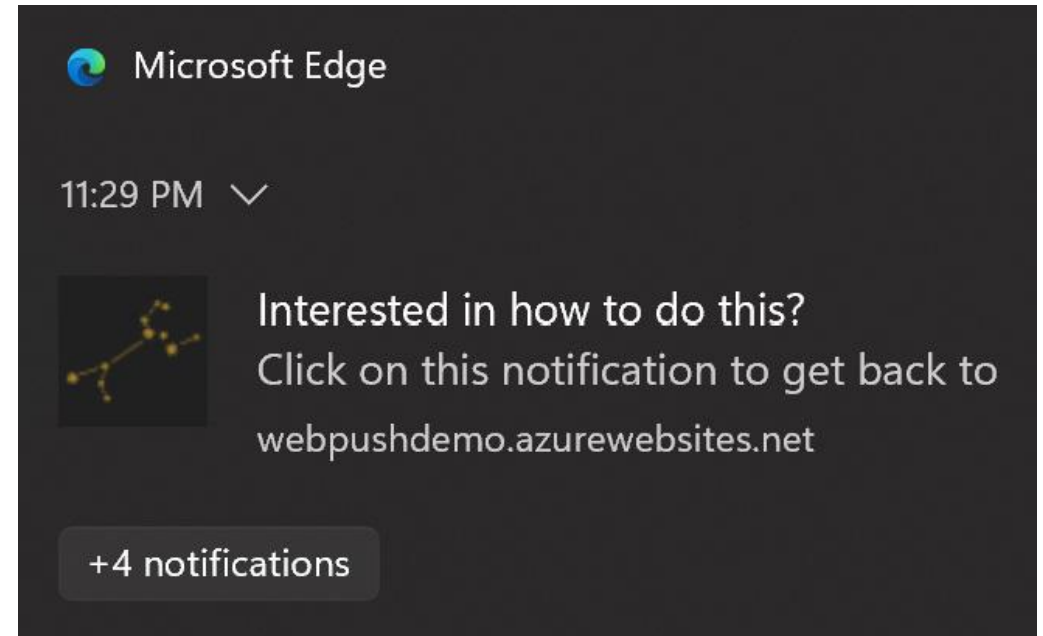
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# Native Features

- Shortcuts
- Window Controls Overlay
- Web Share API
- Badging
- Push Notifications



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# Project Fugu

- **Web Apps should be able to do anything iOS/Android/desktop apps can.**
- File, Url and protocol handling
- Native file system access – save file to its original location
- Run on OS login
- Title bar customization - override default window titlebar
- Share target
- App shortcuts (jump lists)
- <https://web.dev/fugu-status/>

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# 30 Days of PWA

- Step-by-step tutorial for understanding PWAs
- Core Concepts
- Advanced Capabilities
- Developer Tools
- Platforms & Practices
- <https://microsoft.github.io/win-student-devs/#/30DaysOfPWA/>

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# Real World PWAs



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# Source Code

<https://github.com/nesfit/IW5/tree/main/src/CookBook>

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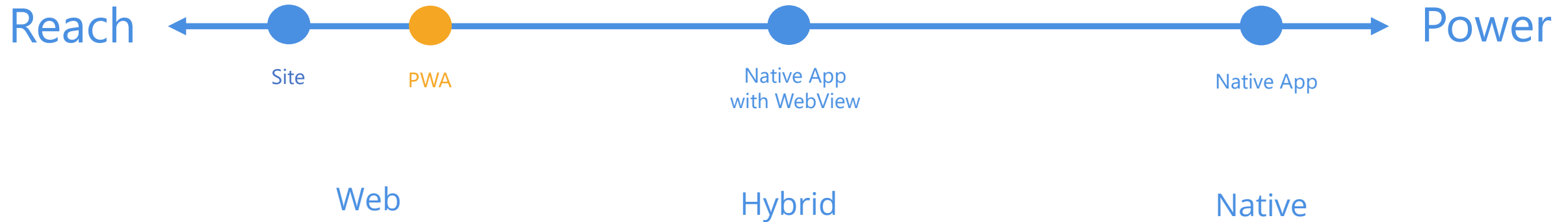
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# Application Development Overview



Web  
App  
Manifest

Service  
Worker

HTTPS

Q&A