

Progressive Web Apps (PWAs)

G3: Lorenz Aichner, Sarah Hörtnagel, Hagen Leitner, Fabian Szakács

What is a PWA?

- Web application with app-like experience.
- Built with web technologies (HTML, CSS, JS).
- Supported by almost all major browsers.
- Installable directly from the browser.
- Runs in standalone mode.
- Secure (HTTPS required).

Advantages

- Offline access (via cached content).
- Cross-platform compatibility.
- Independent of App Store and Google Play.
- Add to Home Screen functionality (A2HS).
- Improved search rankings (SEO).
- Reduced development costs.
- Faster performance.
- No manual updates.
- Push notifications.

Technology

- Web app manifest.
- Service workers:
 - Run in background.
 - Each service worker handles specific task, e.g.:
 - Update cached resources.
 - Enable push notifications.
- HTTPS:
 - Enables secure service worker functionality.
- Application shell:
 - Ensures core UI load immediately.

```
{  
  "name": "PWA Conference",  
  "short_name": "PWA Conf",  
  "icons": [  
    {  
      "src": "icon.svg",  
      "sizes": "any",  
      "type": "image/svg+xml",  
      "purpose": "any"  
    }  
  ],  
  "start_url": ".",  
  "id": "conference",  
  "display": "standalone",  
  "orientation": "portrait",  
  "background_color": "#FFFFFF",  
  "theme_color": "#FFFFFF"  
}
```

Figure 1: Example web app manifest.

Offline Access

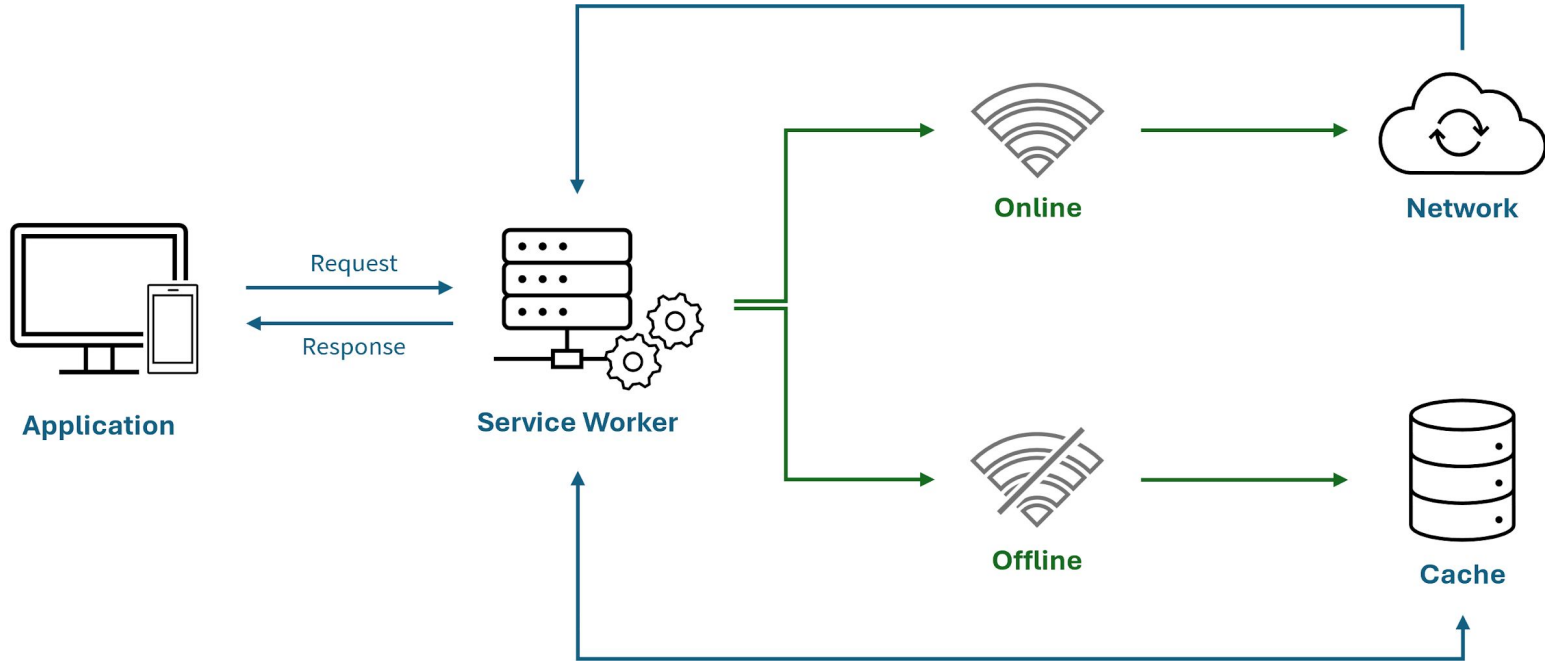


Figure 2: Graphical representation of PWA online and offline mode.

Current Status of PWAs (Nov 2025)

- Supported on all browsers:
 - Safari lagged behind, adding basic support in 2018, with Web Push (notifications) only as late as 2023, about 7 years after Chrome/Firefox.¹
- Deeper device integration (Bluetooth, biometrics) through evolving Web APIs.
- Moved from niche innovation to mainstream adoption.
- Huge increase in time spent on site (Alibaba, Flipkart, Starbucks).²
- Less data usage (Spotify).²

¹ https://developer.mozilla.org/en-US/docs/Web/API/Push_API

² <https://our-thinking.nashtechglobal.com/insights/progressive-web-apps-in-2025>

Examples

- Starbucks
- Notion
- Forbes
- Amazon
- X (Twitter)
- Spotify
- Uber
- Pinterest
- Microsoft Office

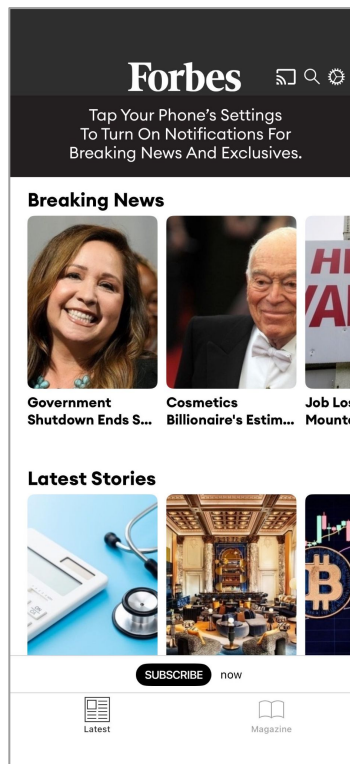


Figure 3: Forbes native app.

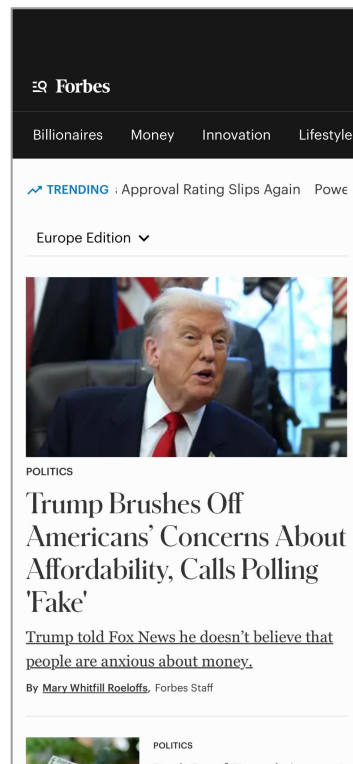
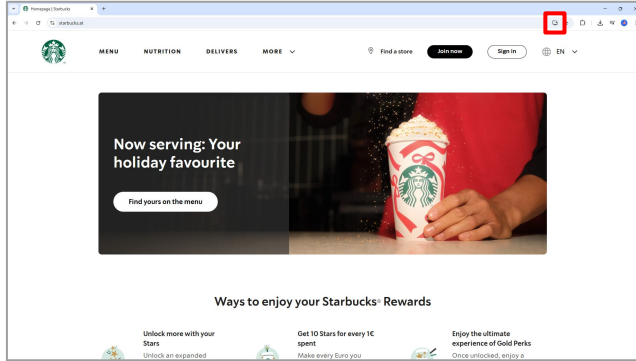


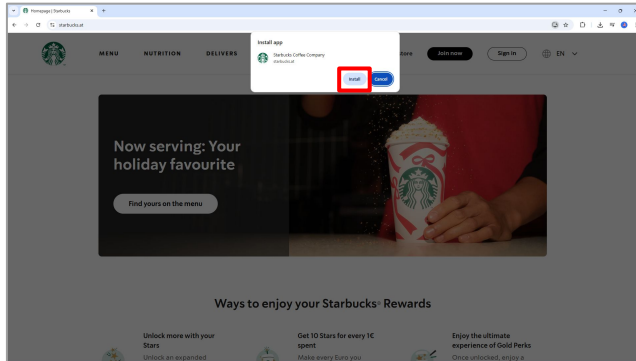
Figure 4: Forbes PWA.

Demo: Install Starbucks PWA (Win11, Chrome)

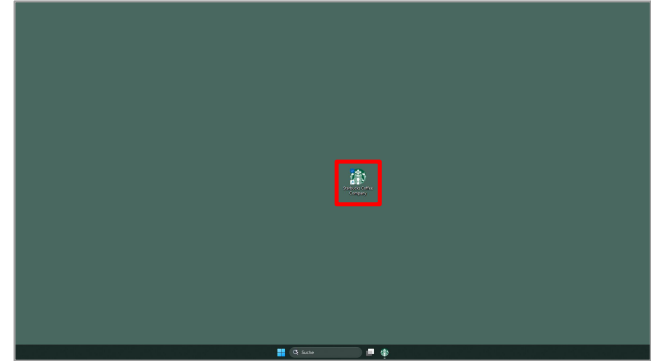
Step 1:



Step 2:



Step 3:



Step 4:

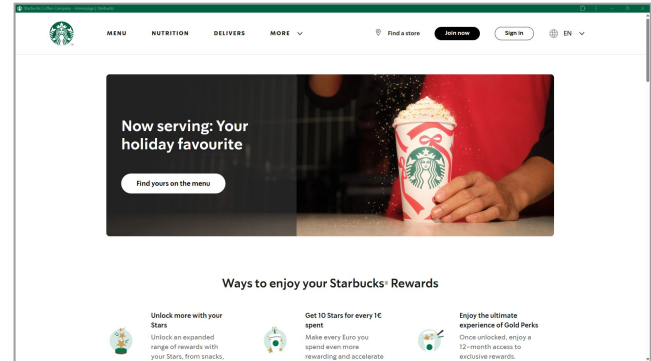
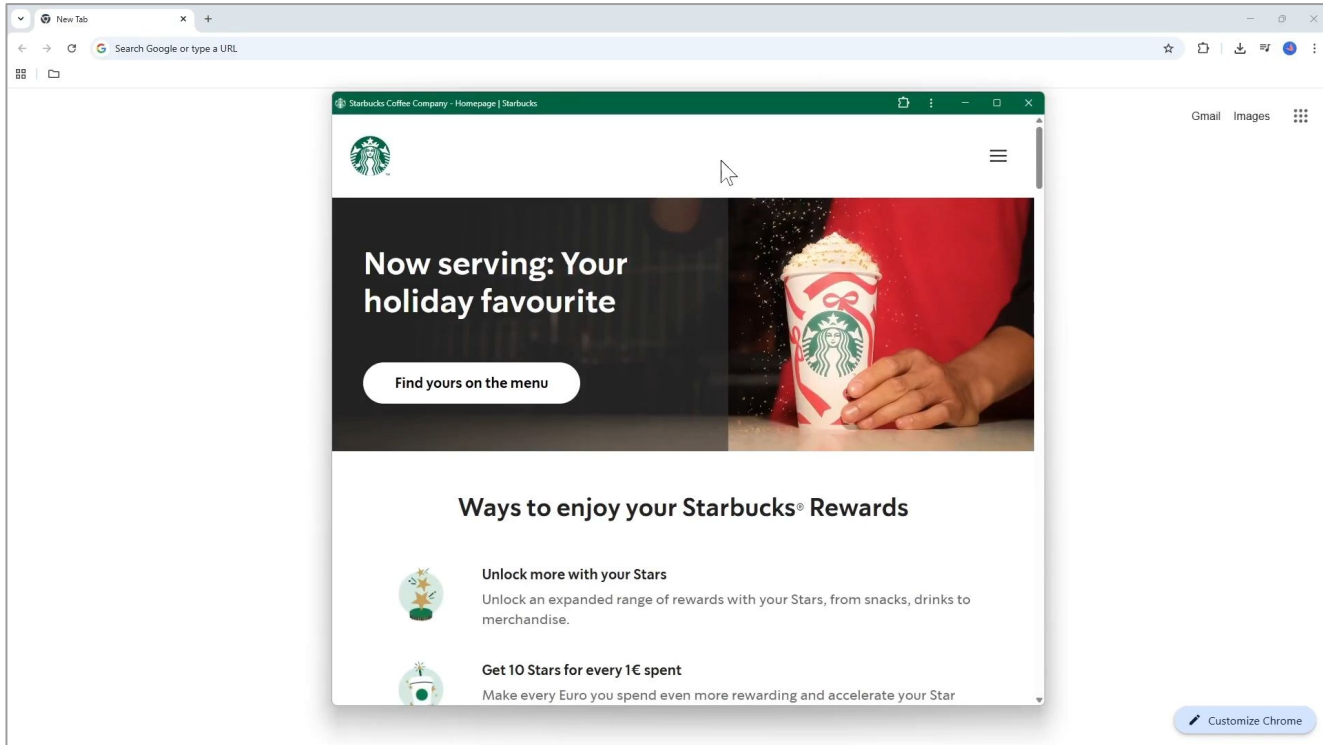


Figure 5: Step-by-step guide how to install the Starbucks PWA to the home screen on desktop PC (Windows 11, Chrome).

Demo: Install Starbucks PWA (Win11, Chrome)



Demo Video: <https://youtu.be/BYxLA5tvAaU>

Demo: Install Starbucks PWA (iOS 26.1, Safari)

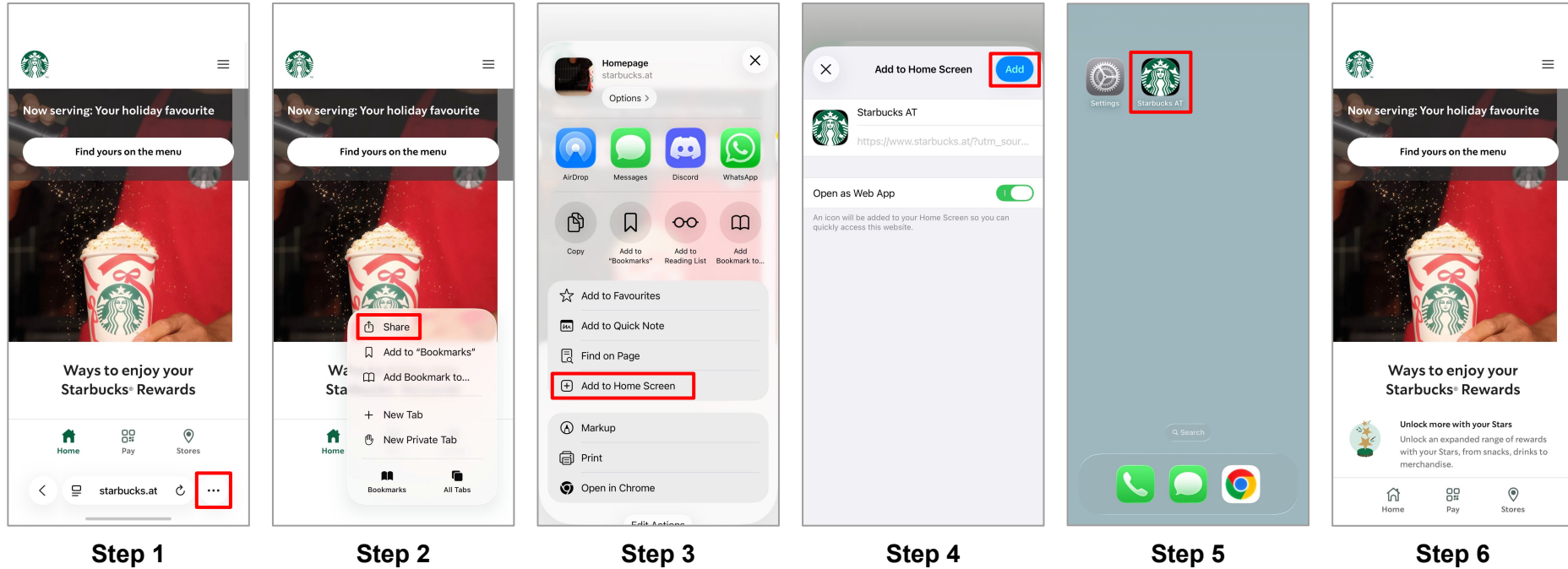
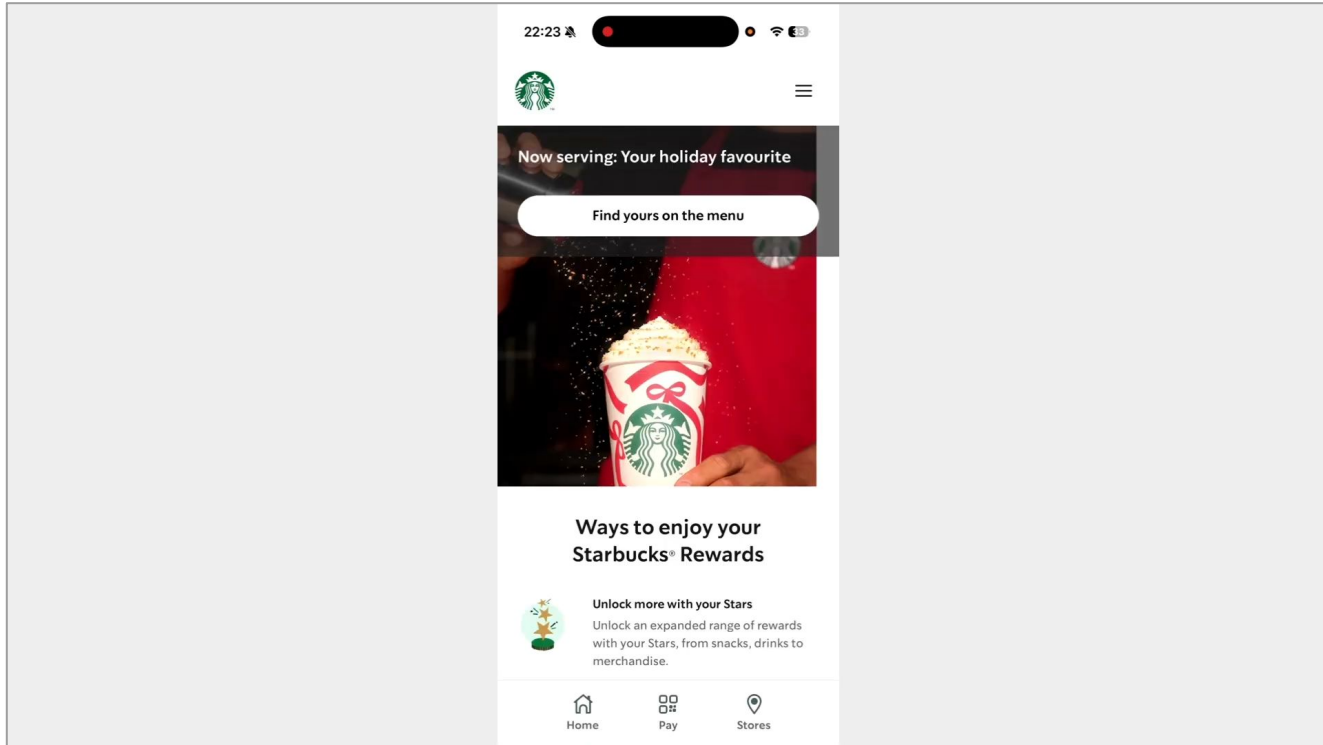


Figure 6: Step-by-step guide how to install the Starbucks PWA to the home screen on iPhone (iOS 26.1, Safari).

Demo: Install Starbucks PWA (iOS 26.1, Safari)



Demo Video: <https://youtu.be/3RLpxqNxmZU>

Support on Desktop

	Windows			macOS				Linux	
	Chrome	Edge	Firefox	Chrome	Edge	Firefox	Safari (Safari 17, 26 Sep 2023) ³	Chrome	Firefox
Add to home screen (A2HS) ^{1,2,3}	✓	✓	✗ ²	✓	✓	✗ ²	✓	✓	✗ ²
Service Workers ⁴	✓	✓	✓	✓	✓	✓	✓	✓	✓
Push Notification ⁵	✓	✓	✓	✓	✓	✓	✓	✓	✓

1 <https://caniuse.com/?search=Web+App+Manifest>

2 https://developer.mozilla.org/en-US/docs/Web/Progressive_web_apps/Manifest

3 https://developer.mozilla.org/en-US/docs/Web/Progressive_web_apps/Guides/Making_PWAs_installable

4 <https://caniuse.com/?search=service+workers>

5 <https://caniuse.com/notifications>

Support on Mobile

	iOS (iOS 15.4, 14 Mar 2022) ¹			Android			
	Chrome	Safari	Firefox	Chrome	Firefox	Samsung Internet	UC Browser
Add to home screen (A2HS) ^{1,2,3}	✓	✓	✓	✓	✓	✓	✓
Service Workers ⁴	✓	✓	✓	✓	✓	✓	✓
Push Notification ^{5,6}	✓	✓	✓	✓	✓	✓	✓

1 <https://caniuse.com/?search=Web+App+Manifest>

2 https://developer.mozilla.org/en-US/docs/Web/Progressive_web_apps/Manifest

3 https://developer.mozilla.org/en-US/docs/Web/Progressive_web_apps/Guides/Making_PWAs_installable

4 <https://caniuse.com/?search=service+workers>

5 <https://caniuse.com/notifications>

6 https://developer.mozilla.org/en-US/docs/Web/API/Push_API

Example Conference PWA

- HTML, CSS
- Based on Hugo and IAWEB Project as template.^{1,2}
- Demo content
- Offline access:
 - Lists all talks for a specific conference.
- Repository: <https://github.com/mercypl0x/conference>
- Demo: <https://mercypl0x.github.io/conference/>

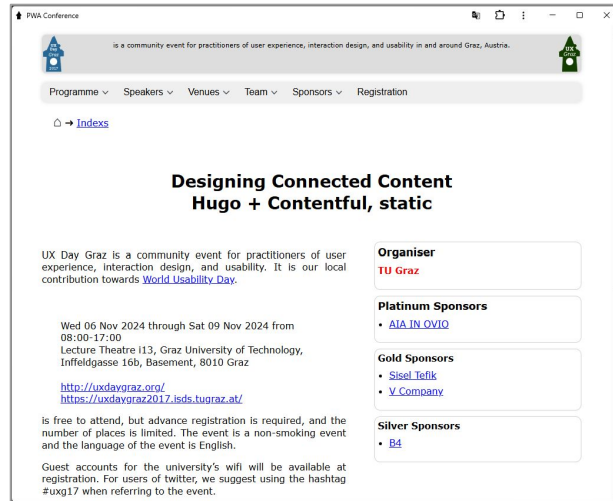
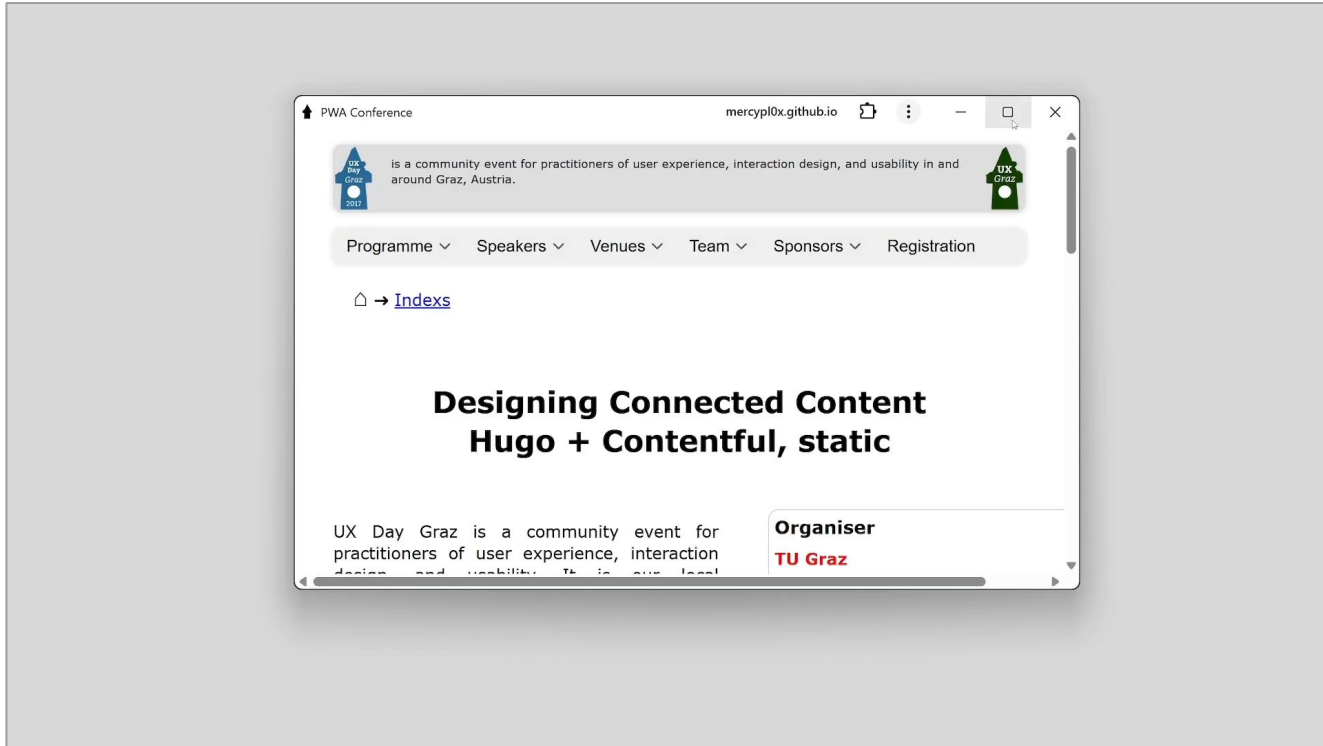


Figure 7: Example conference PWA.

1 <https://gohugo.io/>

2 <https://github.com/ozbej/IAWEB-project>

Demo: Conference PWA (Win11, Chrome)



Demo Video: <https://youtu.be/3uk1VFsMYPM>