Advanced Progressive Web Apps

Push Notifications Under Control

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Hello, it’s me.

Cross-Platform & Serverless

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What’s PWA about anyway?

Apps Today...

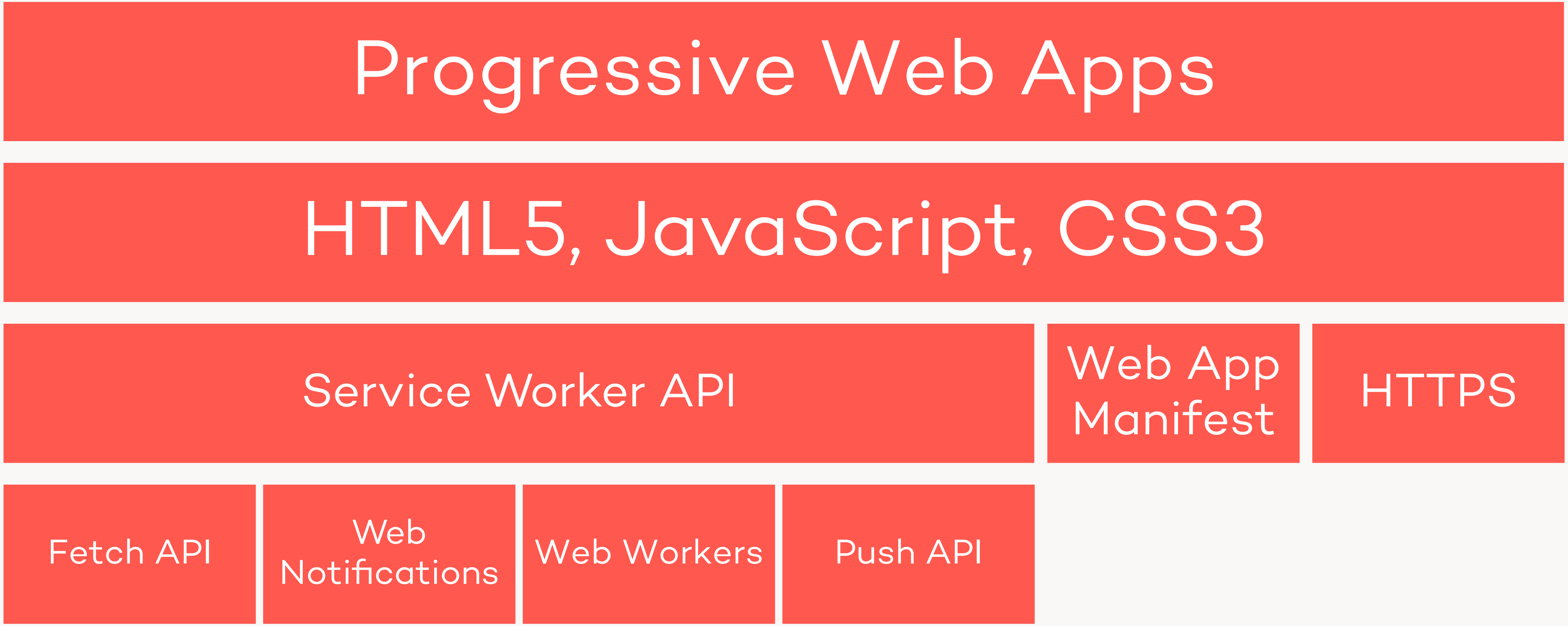
Apps Tomorrow…

Web Goes Native

Google Play

- No app stores anymore!
- Web App = App App
- Cross-platform
- Feature parity: Push notifications, offline availability and more for web & native applications
- Backwards compatibility: PWAs can also be run on non-PWA browsers, but with reduced feature set

PWA Technology Overview



Progressive Web Apps

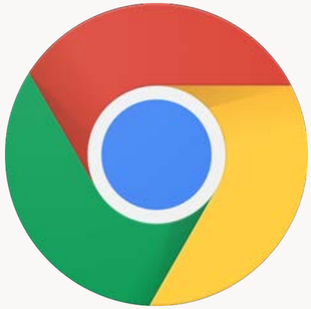
HTML5, JavaScript, CSS3

Service Worker API | Web App Manifest | HTTPS

Fetch API | Web Notifications | Web Workers | Push API

PWA Status Quo

Basic Support



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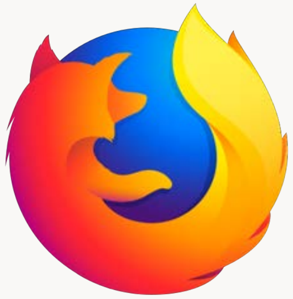

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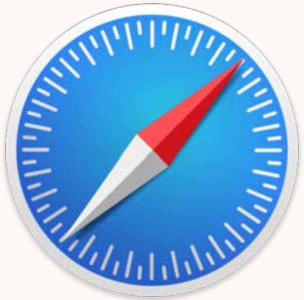

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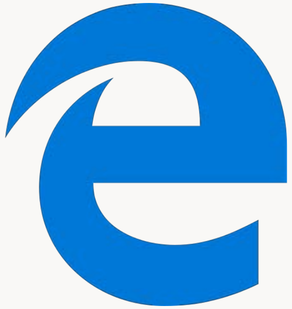

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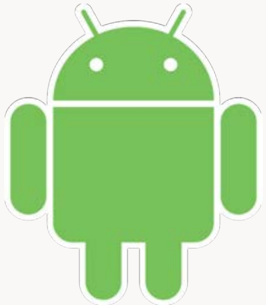

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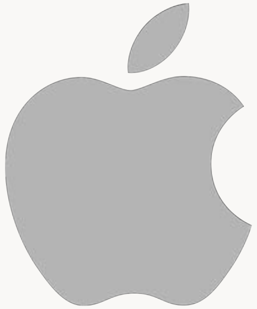
Chrome 40



11.3

“Uber Pattern”

Progressive Web Apps are
not a technology,
but a **collection of properties**
an application must/should support.

“Uber Pattern”

Responsive

Linkable

Discoverable

Installable

App-like

Connectivity Independent

Fresh

Safe

Re-engageable

Progressive

PWA Demo

https://pwa.liebel.io

LIVE DEMO

“Uber Pattern”

- Responsive
- Linkable
- Discoverable
- Installable
- App-like
- Connectivity Independent
- Fresh
- Safe
- Re-engageable
- Progressive

PWA Features

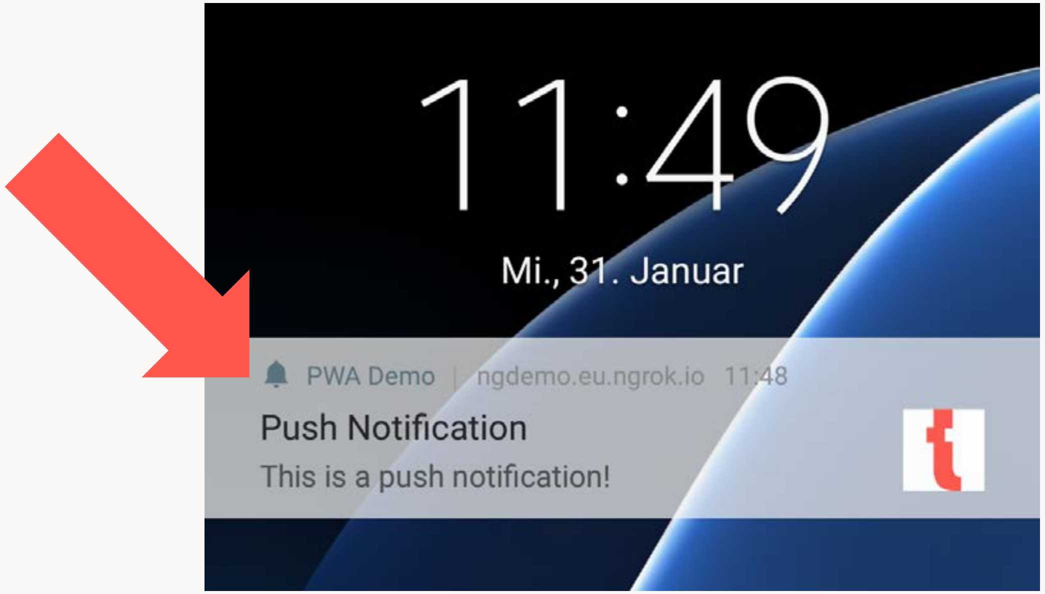
Re-engageable

Hollywood/Push Principle

Don’t call us, we’ll call you!

Re-Engageable

Get the user back with notifications



11:49

Mi., 31. Januar

PWA Demo | ngdemo.eu.ngrok.io 11:48

Push Notification

This is a push notification!

Idea: Push the users to use the app again

Known from social networks or games, etc.

- Peter likes your post.
- Wow! 300 diamonds for $4.95 only!

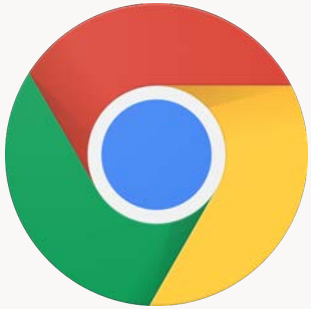
Combination of three technologies:

1. Notifications API
2. Push API
3. HTTP Web Push

Notifications API

Web Notifications API

Support



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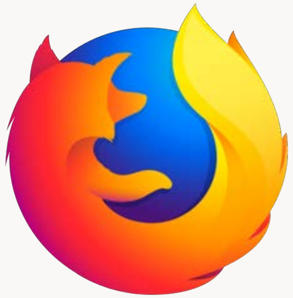

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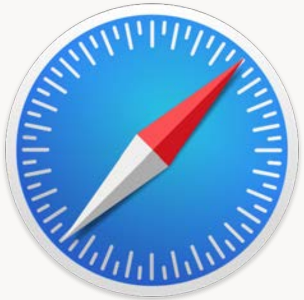

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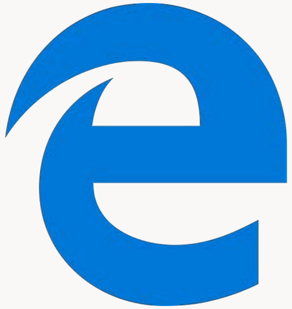
(macOS)



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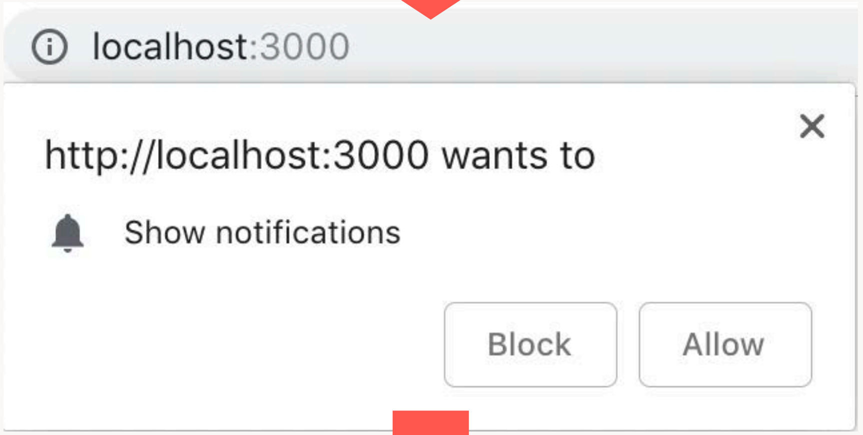
Notifications API

Permissions

```
await Notification.requestPermission();
```



localhost:3000

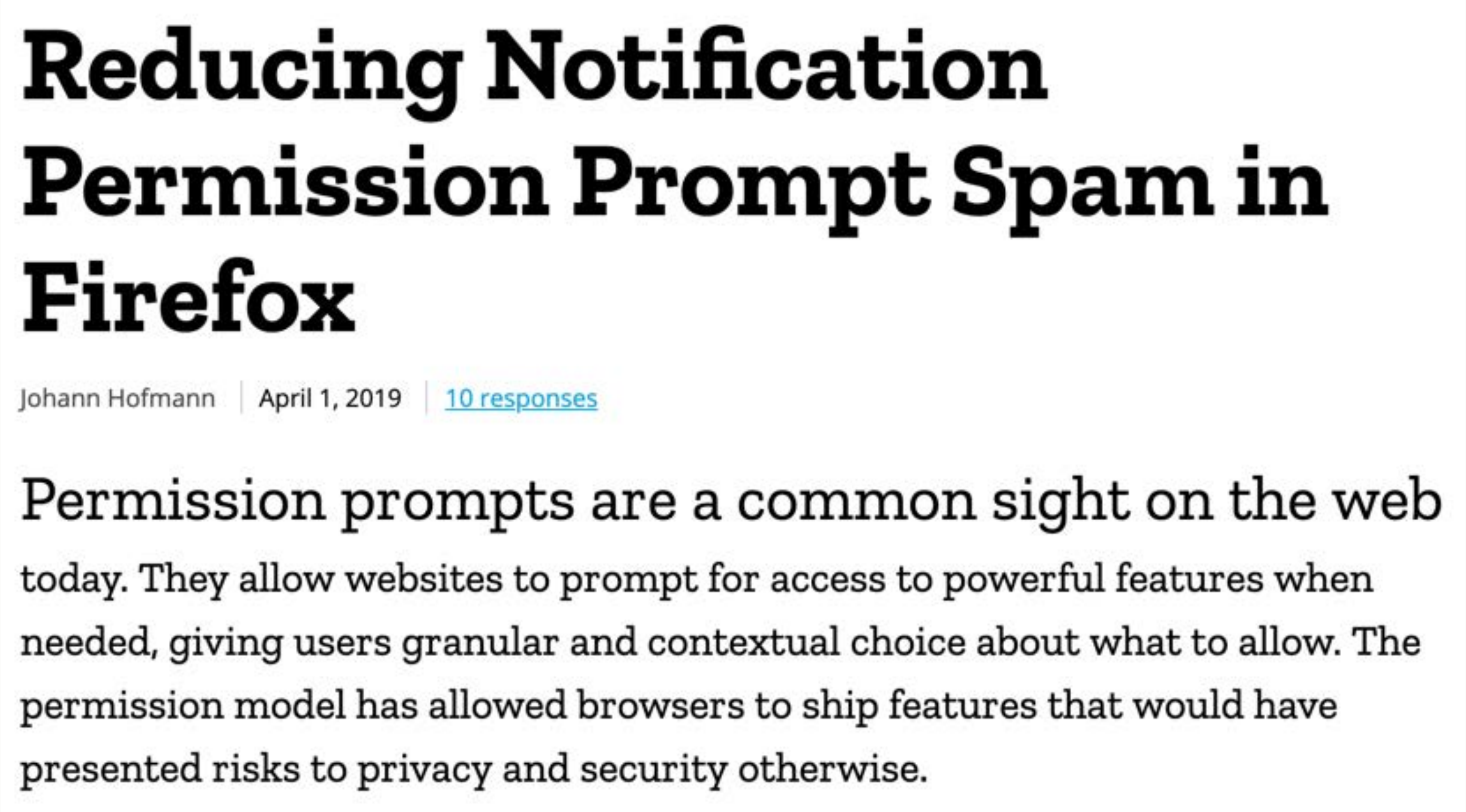
http://localhost:3000 wants to

Show notifications

```
'denied' | 'granted'
```

Notificiations API

Permissions



Reducing Notification Permission Prompt Spam in Firefox

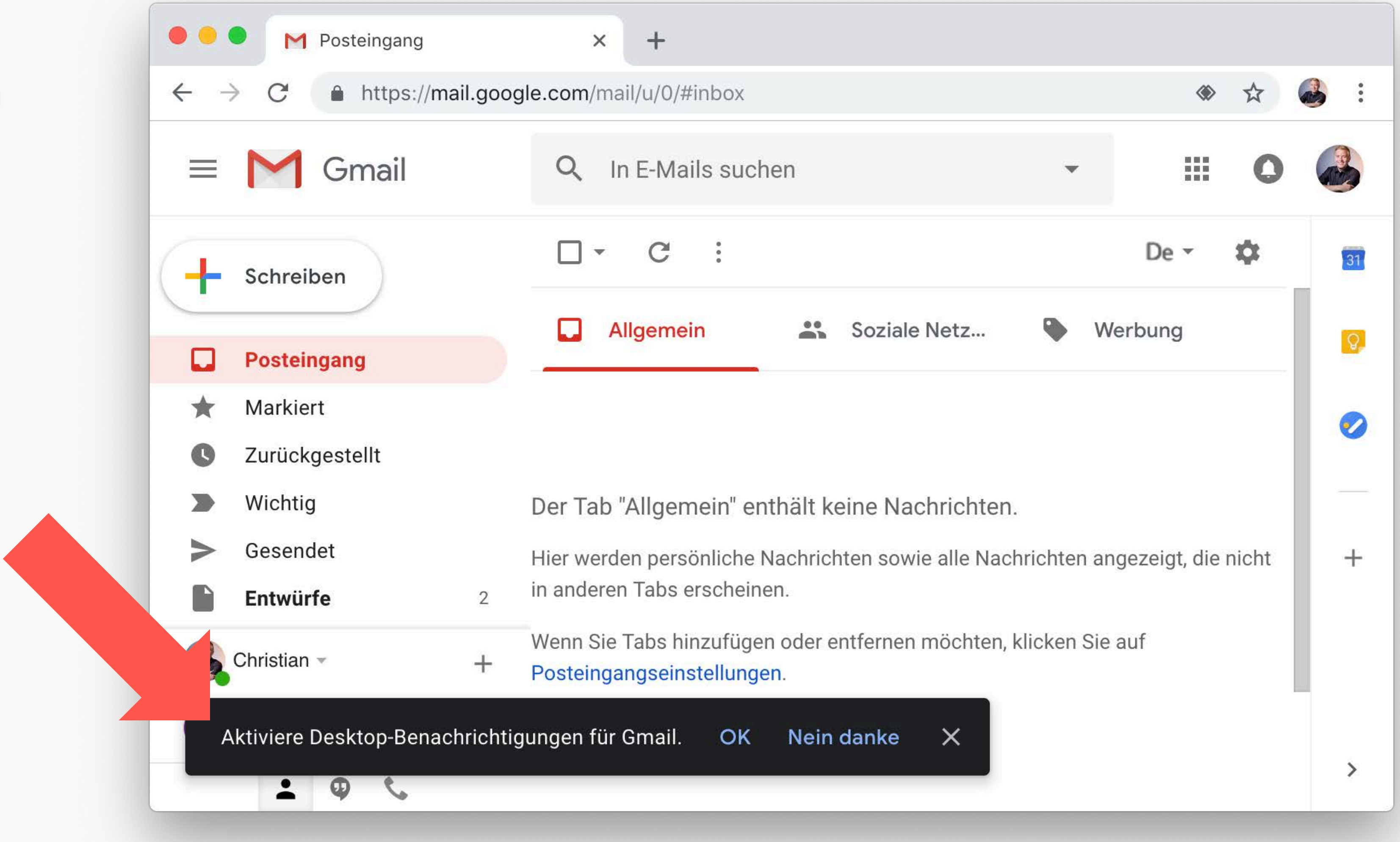
Johann Hofmann | April 1, 2019 | 10 responses

Permission prompts are a common sight on the web today. They allow websites to prompt for access to powerful features when needed, giving users granular and contextual choice about what to allow. The permission model has allowed browsers to ship features that would have presented risks to privacy and security otherwise.

https://blog.nightly.mozilla.org/2019/04/01/reducing-notification-permission-prompt-spam-in-firefox/

Notifications API

Double Permission



Der Tab "Allgemein" enthält keine Nachrichten.

Hier werden persönliche Nachrichten sowie alle Nachrichten angezeigt, die nicht in anderen Tabs erscheinen.

Wenn Sie Tabs hinzufügen oder entfernen möchten, klicken Sie auf Posteingangseinstellungen.

Aktiviere Desktop-Benachrichtigungen für Gmail. OK Nein danke

Notifications API

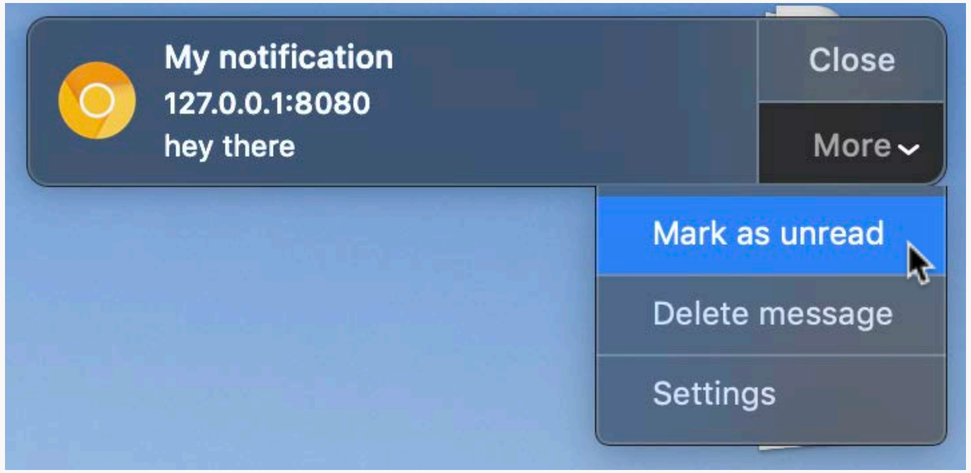
LIVE DEMO

```
async function showNotification() {
    const result = await Notification.requestPermission();
    if (result === 'granted') {
        const noti = new Notification('Hello!', {
            body: 'It’s me.',
            icon: 'icon512.png'
        });
        noti.onclick = () => alert('clicked');
    }
}
showNotification();
```

Notifications API

Properties

- Title
- Text
- Icon/Image
- Vibration pattern
- Action buttons
- Arbitrary structured data



My notification
127.0.0.1:8080
hey there

(platform support may vary)

https://developer.mozilla.org/docs/Web/API/notification

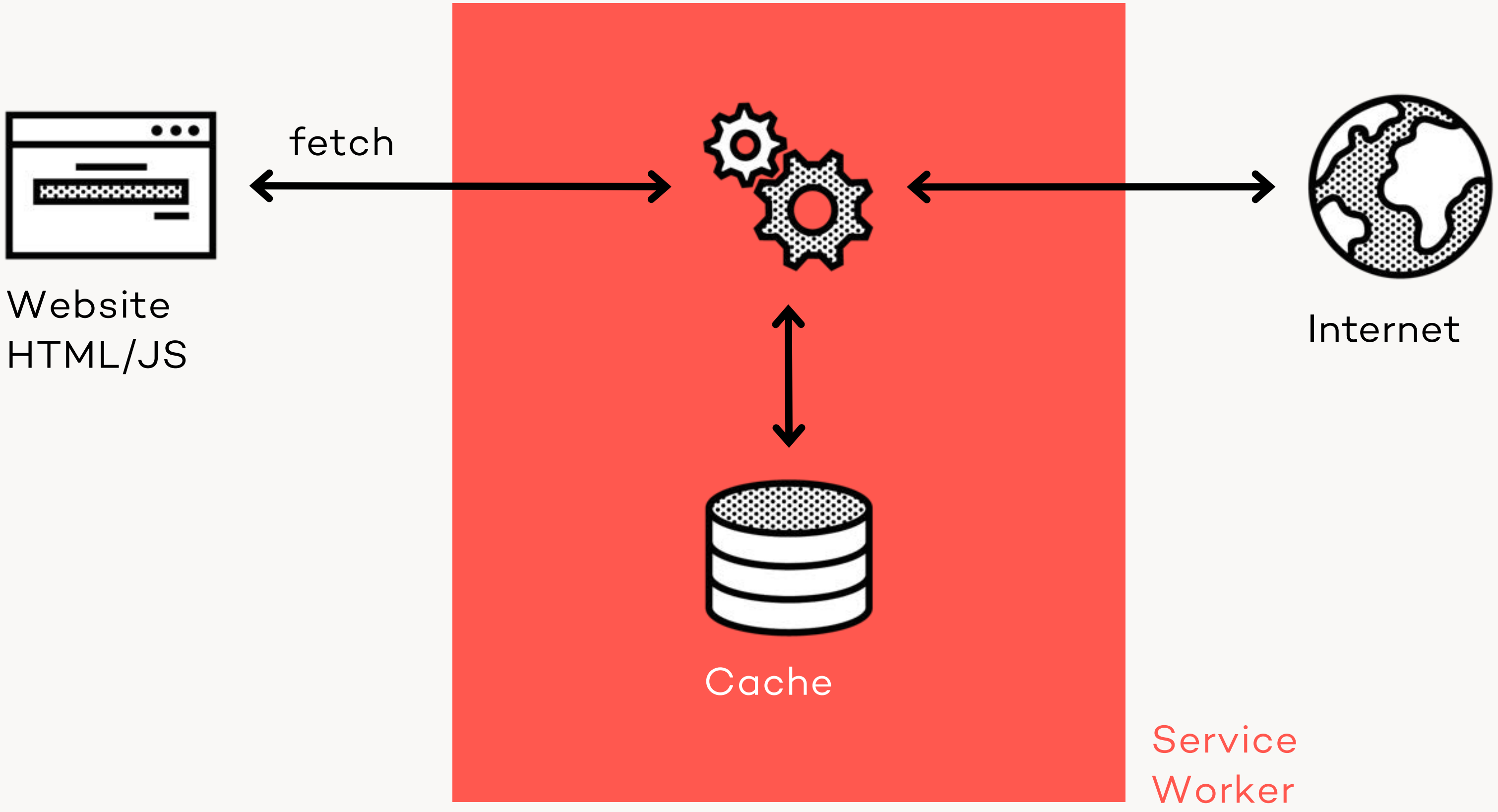
Notifications API

Non-persistent: Sent via web application (automatically close)

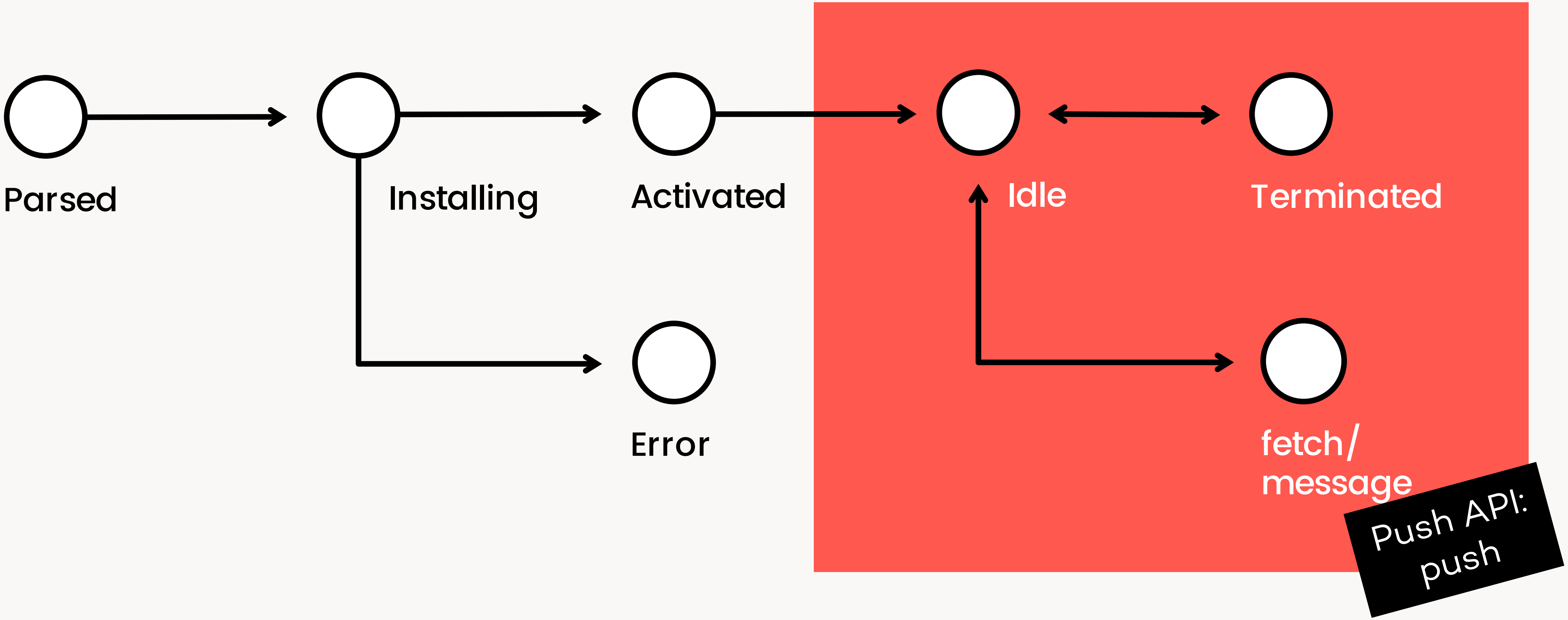
Persistent: Sent via Service Worker/Push API (stay in notification center)

Push API

Service Worker as a controller/proxy/interceptor

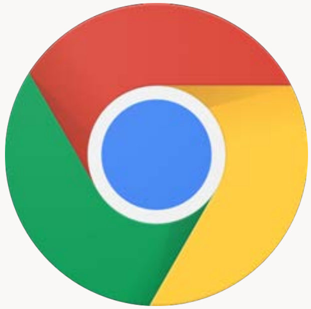


Service Worker Lifecycle



Push API

Support



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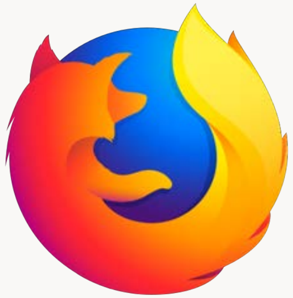

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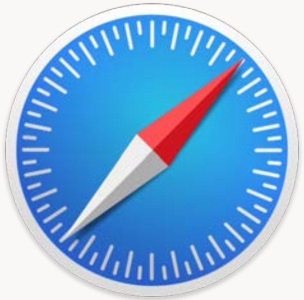

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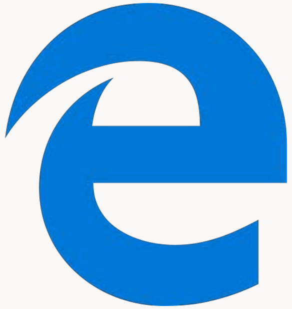

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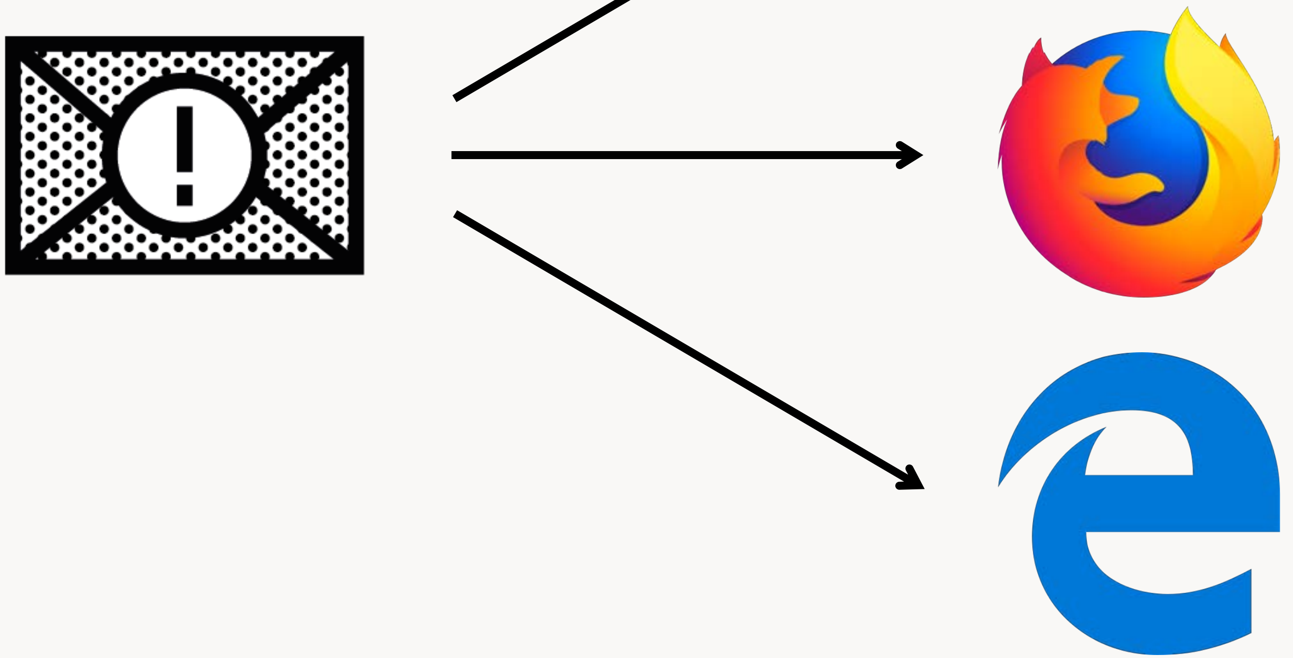
Push API

Push Services



Firebase Cloud Messaging

Mozilla Push Service

Windows Notification Services

Push API

Push Services

Solution: One abstract protocol that can be used by every push service

HTTP Web Push (IETF/RFC 8030)

- HTTP endpoints for push communication
- Push Message Receipts
- Urgency
- Time to live
- Replacing push messages

Push API

Privacy and Security

Push messages should be signed and encrypted (required by Google Chrome)

Push services cannot read the contents of push messages (except traffic data)

Hence, private and public keys are needed

Voluntary Application Server Identification (VAPID) for Web Push

Push API

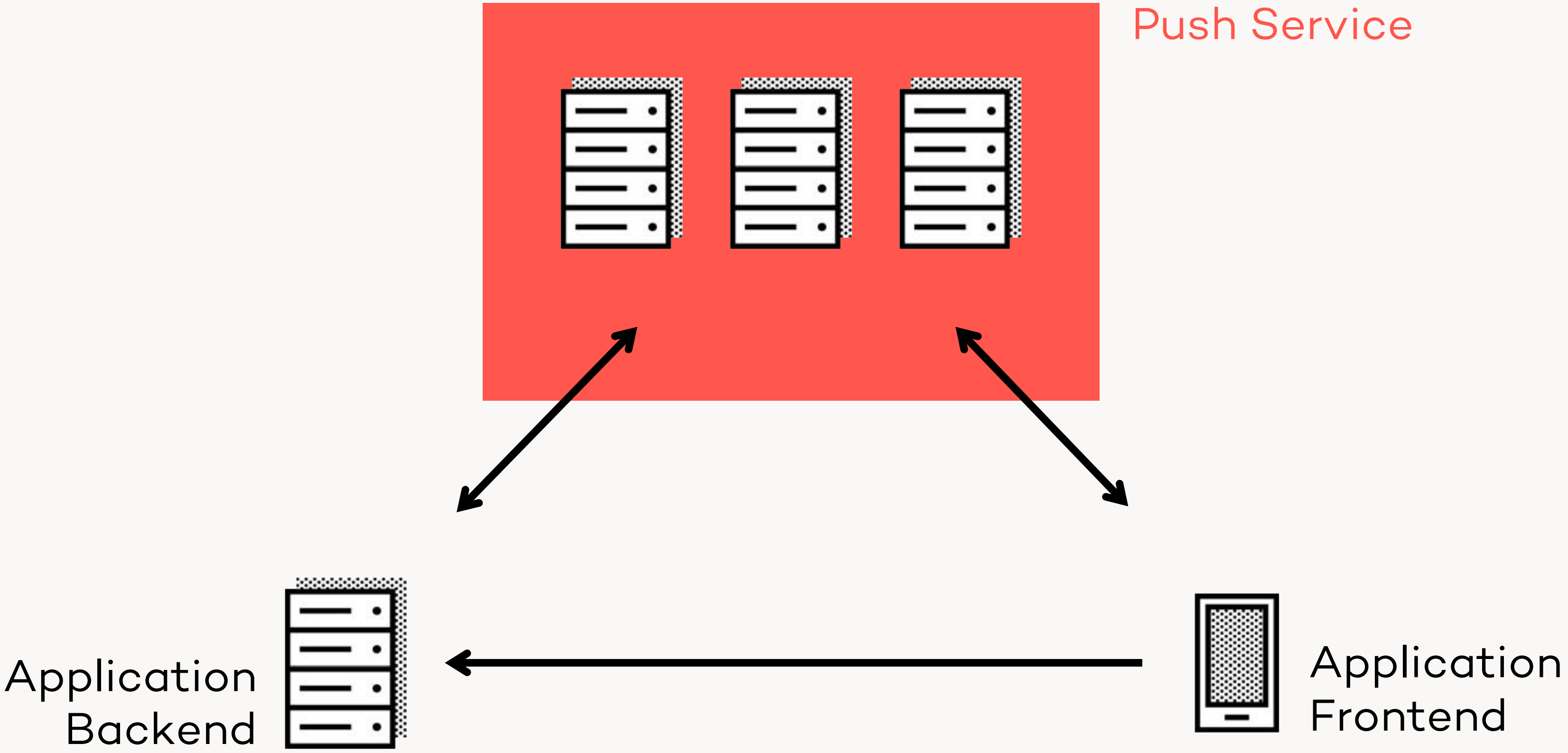
Voluntary Application Server Identification

Voluntary

- Servers do not have to authenticate.
- No API keys or logins are required.
- Using the push services is completely free!
- Voluntarily, developers can provide contact information to get notified in case something goes wrong.

Push API

Flow



LIVE DEMO

Push API

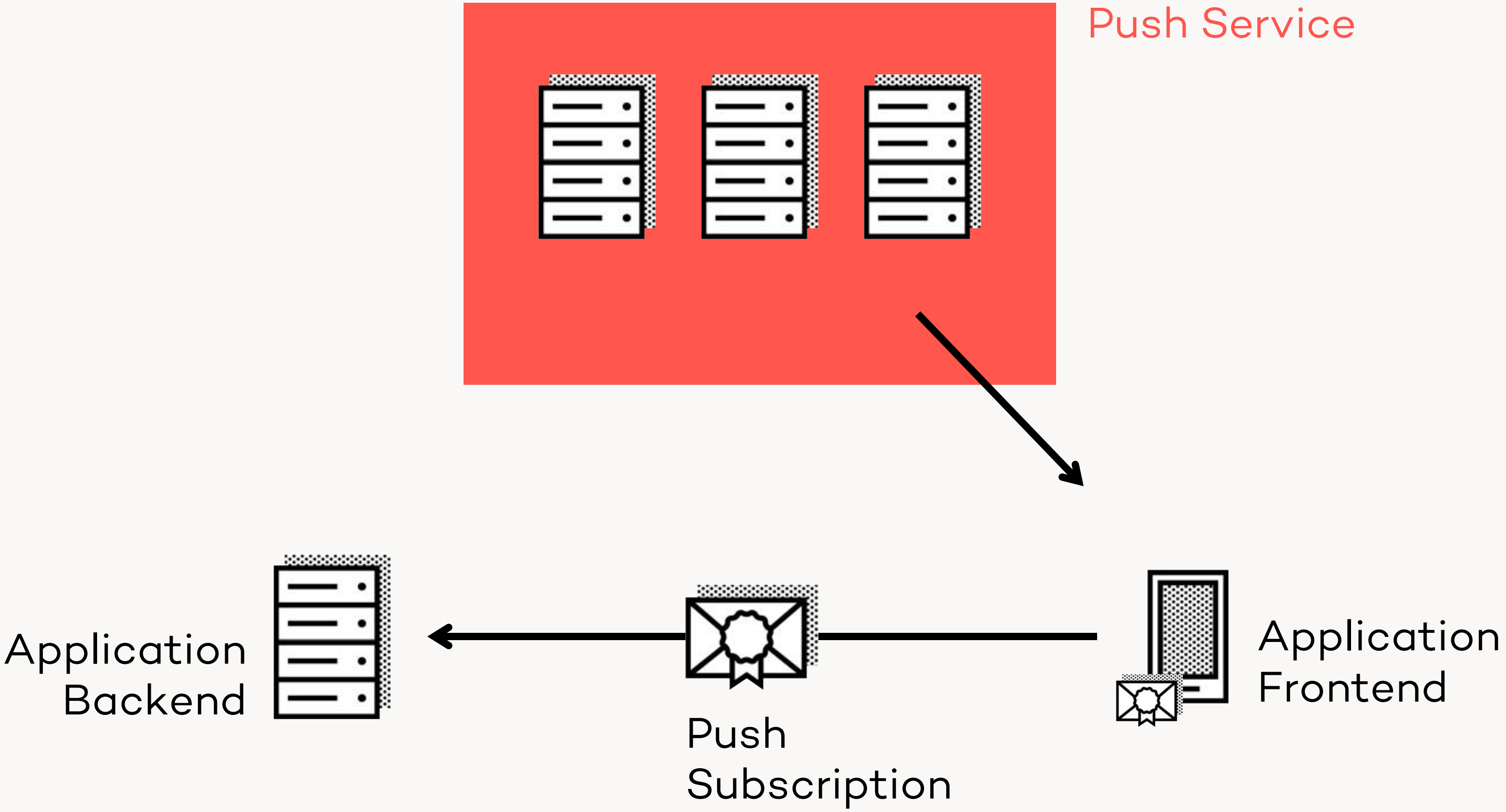
Flow

Progressive Enhancement

```
if ('serviceWorker' in navigator) {
  navigator.serviceWorker.register('sw.js');
  navigator.serviceWorker.ready.then(registration => {
    if ('PushManager' in window) {
      registerForPush(registration.pushManager);
    }
  });
}
```

Push API

Flow



Push API

Flow

```
function registerForPush(pushManager) {
  const options = { userVisibleOnly: true,
applicationServerKey: new Uint8Array([/* … */]) }

  pushManager.subscribe(options)
    .then(subscription => console.log(subscription.toJSON()))
    .catch(error => console.log(error));
}
```

Public VAPID key

Send to server

Push API

Flow

LIVE DEMO

For this demo, we're replacing the server side part by an online tool:

https://pwapraxis-push.glitch.me

In productive scenarios, you would send the push subscription JSON to your backend.

- Typically, the user is already signed in, so you can attach the push subscription to the user's registration (e.g. for messenger apps)
- Don't forget that a user can have more than one device, thus a user can have more than one active push subscription

Push API

VAPID & Web Push Libraries

Ready-to-use packages are available for different server platforms
https://github.com/web-push-libs/

- Node.js
- .NET
- Java
- Python
- …

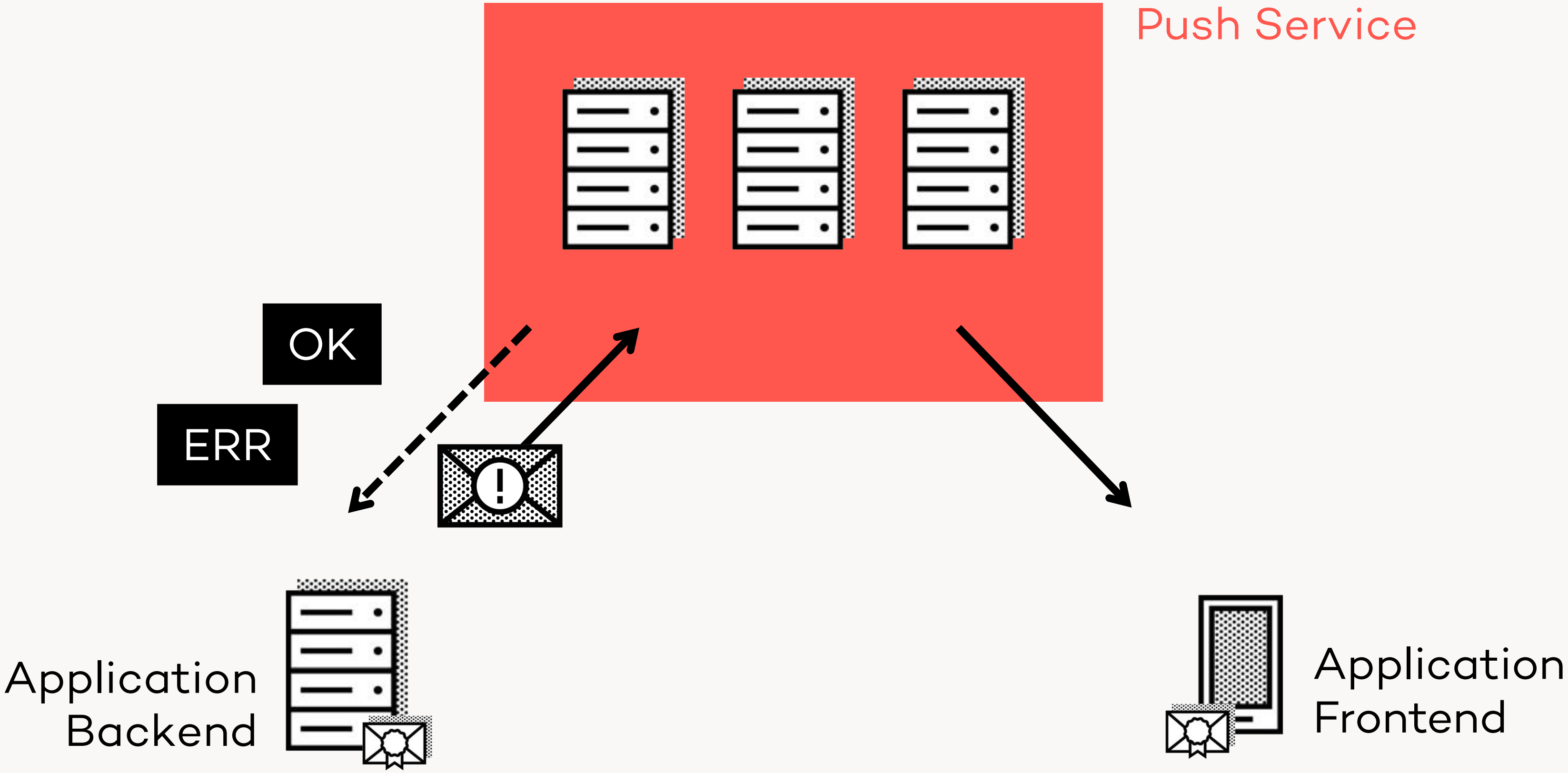
Push API

VAPID & Web Push Libraries

```
const webpush = require('web-push');

// VAPID keys should only be generated only once.
const vapidKeys = webpush.generateVAPIDKeys();

webpush.setVapidDetails('mailto:example@yourdomain.org',
  vapidKeys.publicKey, vapidKeys.privateKey);

webpush.sendNotification(pushSubscription, { title: 'Hello' });
```

Push API

Flow



Push API

Flow

LIVE DEMO

```
self.addEventListener('push', event => {
  const notification = event.data.json();
  self.registration.showNotification(notification.title,
notification);
});
```

Push API

Handle Notification Clicks

```
self.addEventListener('notificationclick', event => {
  event.notification.close();
  if (event.action === 'ok') {
    event.waitUntil(
      client.openWindow(event.notification.data.url)
    );
  }
});
```

Push API

Handle Notification Closes

```
self.addEventListener('notificationclose', () => {
  // Log analytical data
});
```

Limitations

No silent push allowed (Google team experiments with a Budget API)

Inline reply functionality is not a part of the Notifications API

Only one-off pushes sent in via server are currently possible

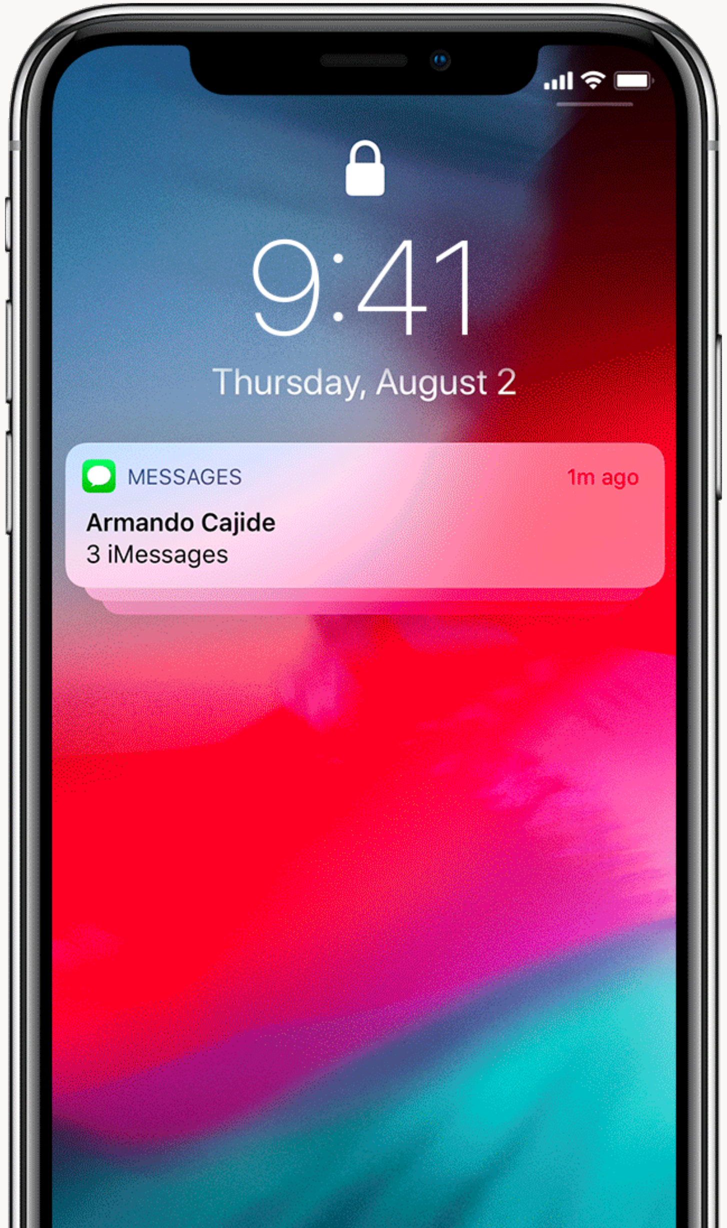
Not supported by Apple Safari on desktop and mobile
- Safari Push Notfications: an alternative for the desktop platform
- No information on whether or when push will be supported

“Polyfills” on iOS

Send an SMS

Neither shows app name nor icon

Tapping the notification opens Messages



9:41

Thursday, August 2

MESSAGES 1m ago

Armando Cajide
3 iMessages

https://support.apple.com/en-us/HT201925

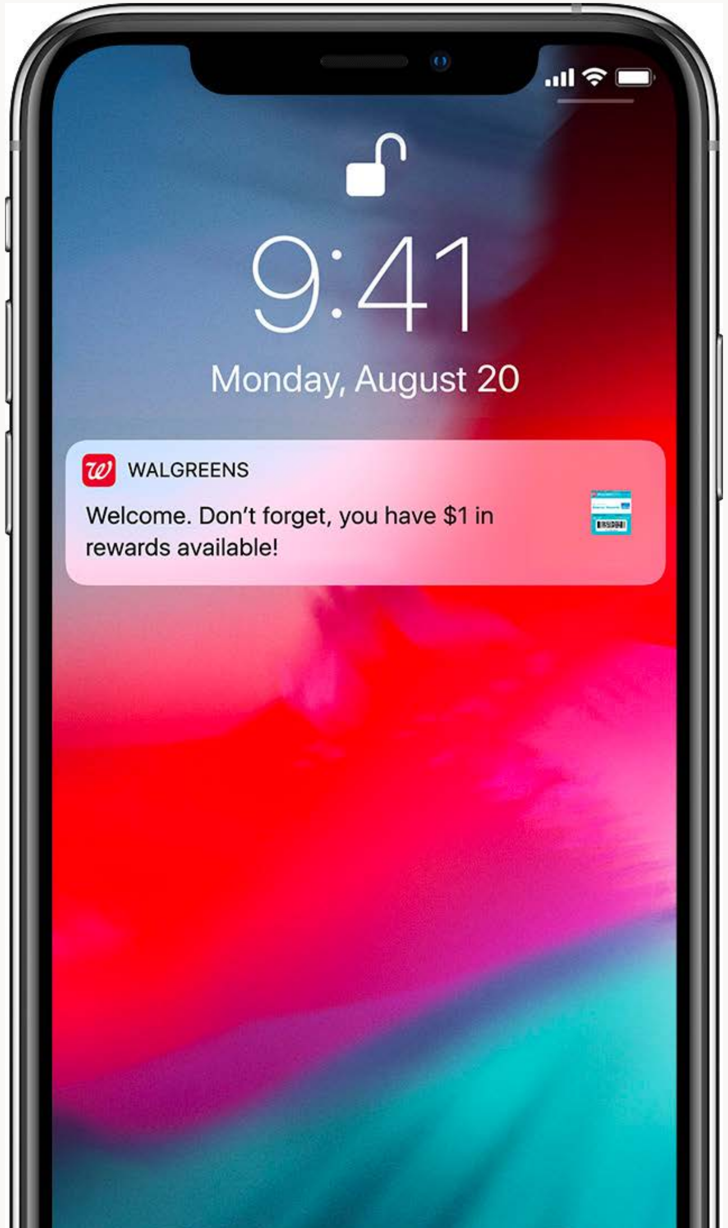
“Polyfills” on iOS

Wallet Push Notification

Can show app name and icon

Requires registering a pass first

Tapping the notification opens the pass



WALGREENS

Welcome. Don’t forget, you have $1 in rewards available!

https://support.apple.com/en-us/HT204003

“Polyfills” on iOS

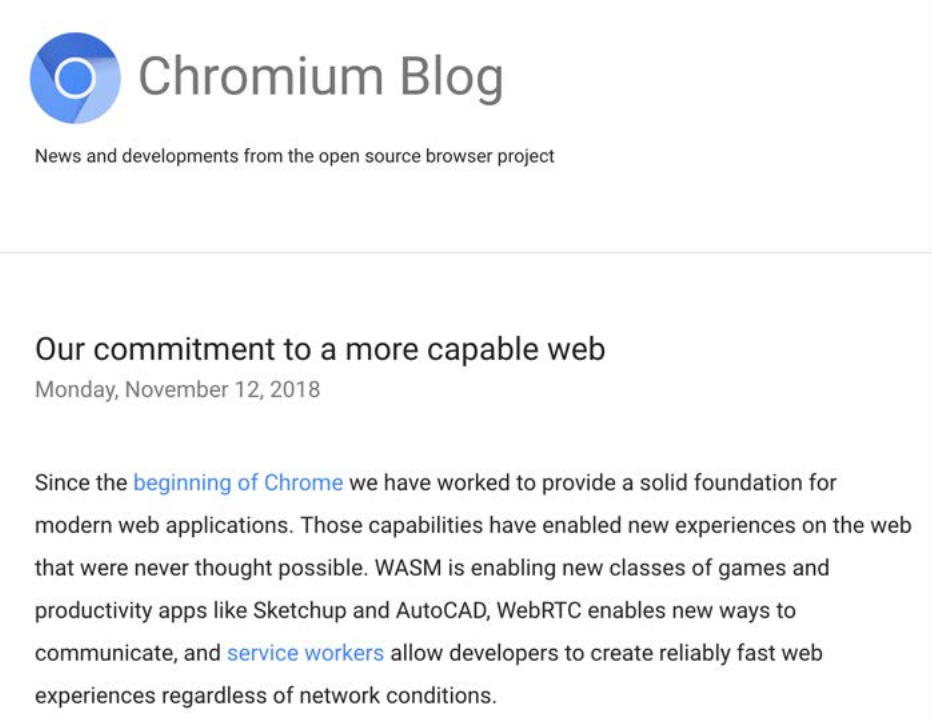
Native wrapper (Cordova)

✅ Shows app name and icon

✅ Tapping the notification opens the app

❌ Requires App Store distribution (!= PWA)

Project Fugu



Chromium Blog

News and developments from the open source browser project

Our commitment to a more capable web

Monday, November 12, 2018

Since the beginning of Chrome we have worked to provide a solid foundation for modern web applications. Those capabilities have enabled new experiences on the web that were never thought possible. WASM is enabling new classes of games and productivity apps like Sketchup and AutoCAD, WebRTC enables new ways to communicate, and service workers allow developers to create reliably fast web experiences regardless of network conditions.

Writable Files API

Badging API

Wake Lock API

Web Share Target API

Contacts Picker

User Idle Detection API

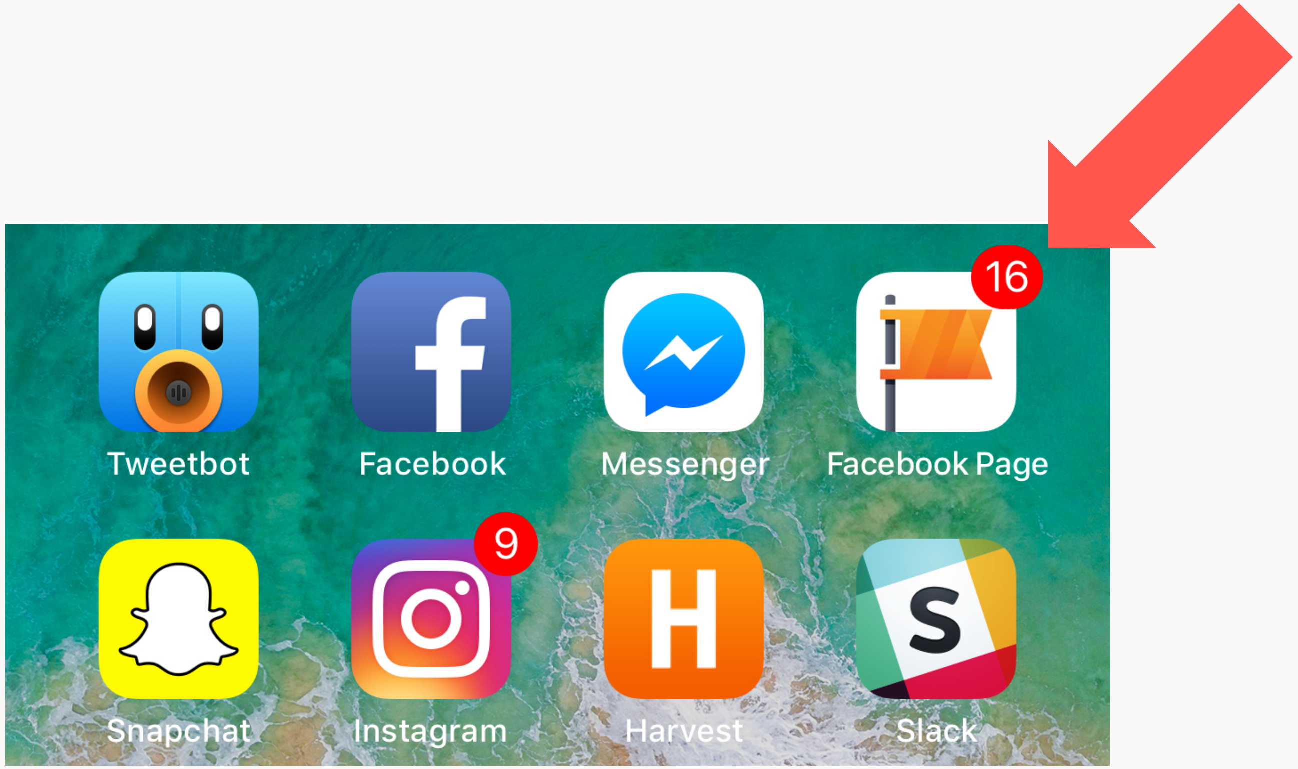
Async Cookie API

Notification Triggers

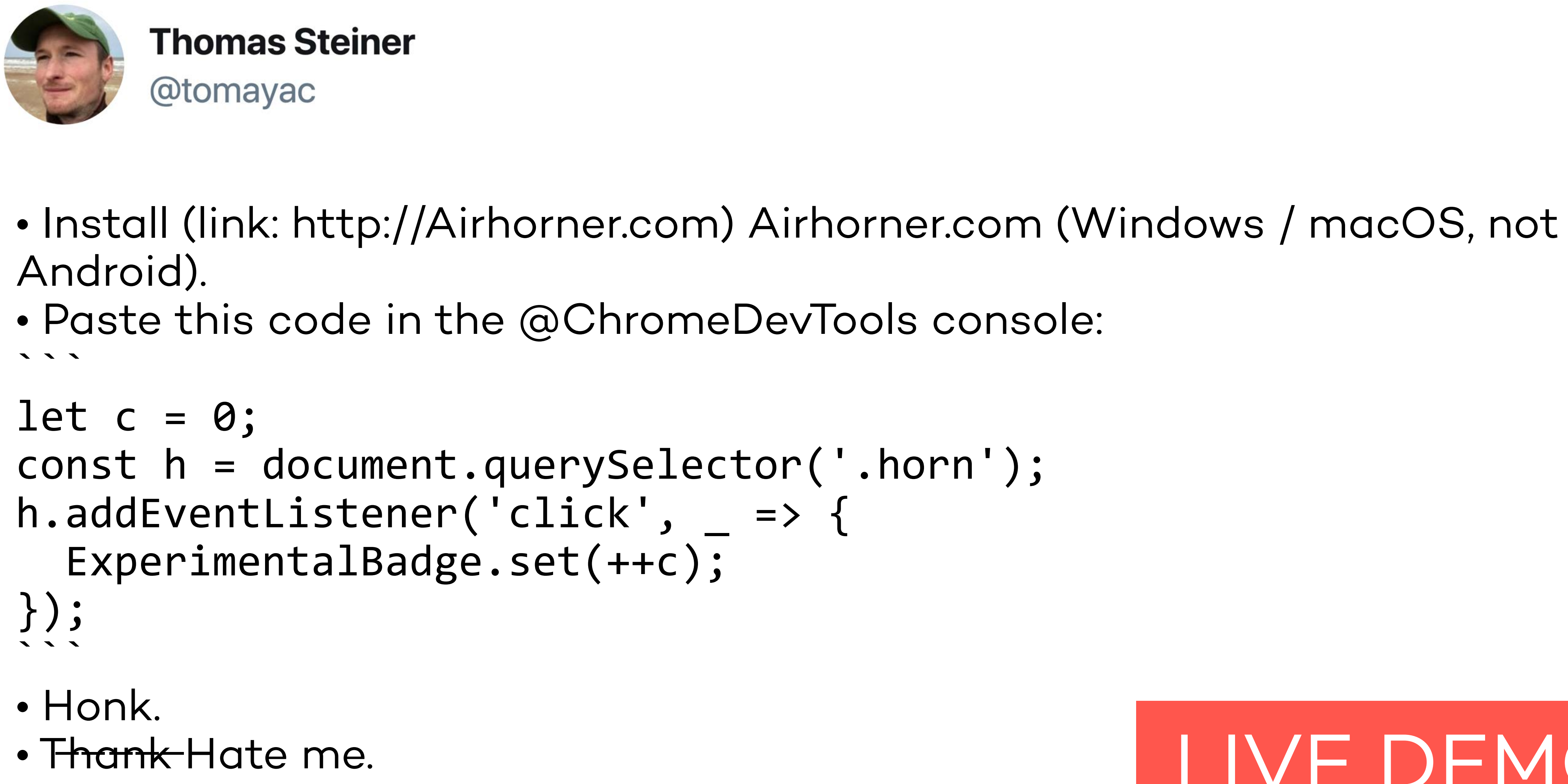
Web HID API

Project Fugu

Badging API



```
self.Badge.set();
self.Badge.set(16);
self.Badge.clear();
```



Thomas Steiner
@tomayac

- Install (link: http://Airhorner.com) Airhorner.com (Windows / macOS, not Android).
- Paste this code in the @ChromeDevTools console:

```
let c = 0;
const h = document.querySelector('.horn');
h.addEventListener('click', _ => {
  ExperimentalBadge.set(++c);
});
```

- Honk.
- ~~Thank~~ Hate me.

LIVE DEMO

https://twitter.com/tomayac/status/1114131251181555714

Project Fugu

Notification Triggers

Currently, only one-off push notifications can be shown (sent in via push)

Notification Triggers will allow you to schedule your notifications (i.e., calendar reminders or pre-calculated game events)

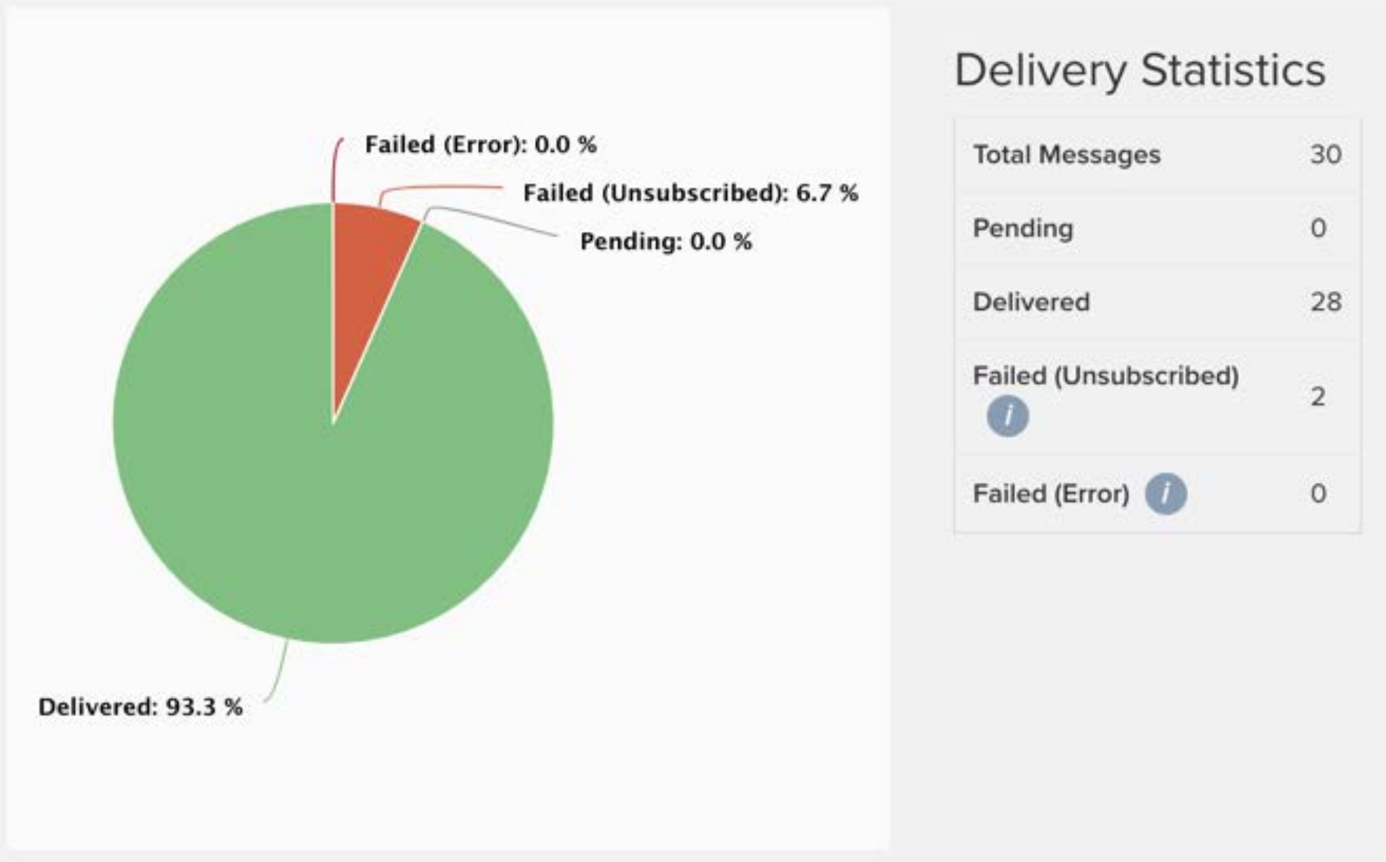
```
swRegistration.showNotification('Reminder', {
  tag: 'reminder',
  body: 'Your appointment is due in ten minutes!',
  showTrigger: new TimestampTrigger(timestamp - TEN_MINUTES)
});
```

Third-Party Services

OneSignal

Pushpad

Pushcrew



Delivery Statistics

Total Messages	30
Pending	0
Delivered	28
Failed (Unsubscribed)	2
Failed (Error)	0

LIVE DEMO

Push During Runtime

WebSockets

For pushing arbitrary/structured data, you might want to consider a different method to push messages during runtime.

.NET: ASP.NET Core SignalR

Node.js: socket.io

…

Questions?

Thank you

for your kind attention!

thinktecture

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