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Angular’s PWA: SwPush and SwUpdate

Arjen Brandenburgh · Follow

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Not too long ago, I wrote an article Your Angular app as Progressive Web App where I explained why Progressive Web Apps are the future of web applications. In that article I also briefly touched the Angular SwPush and SwUpdate APIs, where I also mentioned I might write an additional article to go deeper into that subject. A promise is a promise, so here it is! I’ll go a bit deeper into the possibilities these two APIs have to offer and show some examples. SwPush and SwUpdate are both conveniently exposed in the same package `@angular/service-worker` , which we’re obviously going to use.

VAPID keys

So before we start, I have to mention that this article is going to mainly focus on the frontend part of things. That being said, we do need a little bit of background information about the backend to be able to create an entire working system. As you're probably aware, a push message (notification) gets sent from a server somewhere that our web app will act on. The authenticity of these messages can be verified by an encrypted key-pair, making sure that the notifications our app shows are actually coming from us. This key-pair is called VAPID and stands for *The Voluntary Application Server Identification for Web Push*. When we generate this, we will end up with a public- and private key. Generating your own VAPID keys is so easy, you could have done it in less time than you've spent reading this paragraph. You only need two simple commands:

```
npm install web-push -g
web-push generate-vapid-keys
```

SwPush

Not too long ago Angular started supporting push notifications through SwPush, which allowed developers to listen and subscribe to, push notification from the service worker. However, it was lacking the possibility to interact with these notifications. So users were able to receive notifications, but clicking on it simply didn't do anything.

This fortunately changed around Angular version 7.1 where we can now add actions to our notifications. Before we are able to send notifications, users have to opt-in to your website's notifications. We can request this by using the SwPush's `requestSubscription`. To demonstrate this we're going to create a component `NotificationComponent` that shows a button. When a user clicks it, we're going to try to subscribe that user to show notifications. This component will use our own service `WebNotificationService` to actually submit the subscription to our server.

The component we're going to use has a single interaction element: a button, which when clicked will create a subscription and send this to our backend. This button is where our users will start the web-push journey.

```
import { Component } from '@angular/core';
import { SwPush } from '@angular/service-worker';

import { WebNotificationService } from './../services/web-
notification.service';

@Component({
  selector: 'app-notification-button',
  template: `
    <button (click)="submitNotification()">
       Notify me
    </button>
    <p *ngIf="isGranted" class="success">
      Notifications were granted by the user
    </p>
    <p *ngIf="!isEnabled" class="error">
      Notifications are not available in the browser or enabled in
the application
    </p>
  `,
  styles: [`
    .success {
      color: green;
    }
    .error {
```

Resulting in this output which we will use later. However: **do not use these keys and generate your own!**

```
Public Key:
BJdhtb8aRkQIzmi217hck-
EUWO7jIQZR2dlI856wxCAFUgCIqnLY0n254gjSOAMNc9TydEf8aLoSjMMW_1QYBME
Private Key:
zJ6QK5pB6b0kpiYrtTpqu5zZ0GetmB84ob0Q1n6RZp0
```

```
      color: red;
    }
  `]
})
export class NotificationComponent {
  isEnabled = this.swPush.isEnabled;
  isGranted = Notification.permission === 'granted';

constructor(private swPush: SwPush,
              private webNotificationService:
WebNotificationService) {}

submitNotification(): void {
    this.webNotificationService.subscribeToNotification();
  }
}
```

As you probably noticed, we also have two <p> elements. The first one informs the user that he has granted our website permission to send notifications. This check is done by looking at the browser native object `Notification` and checks what the given permission is. The second <p> element tells the user that their browser either (1) does not support service workers, or (2) the service worker is not enabled in the application.

When the user has interacted with our button, we will send the subscription to the server. This logic has been delegated to our `WebNotificationService`, so let's have a peek at that. This is also where our previously discussed VAPID public key comes in!

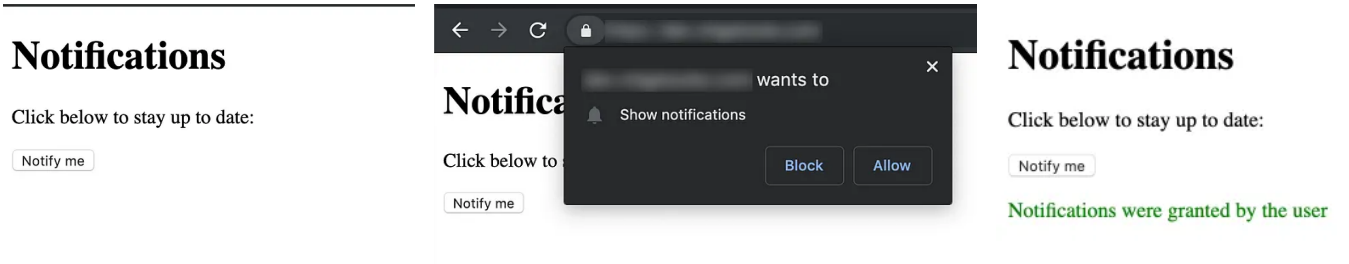
```
import { Injectable } from '@angular/core';
import { HttpClient } from '@angular/common/http';
import { SwPush } from '@angular/service-worker';

@Injectable({
  providedIn: 'root',
})
export class WebNotificationService {
  readonly VAPID_PUBLIC_KEY = '<VAPID-PUBLIC-KEY-HERE>';
  private baseUrl = 'http://localhost:5000/notifications';

  constructor(private http: HttpClient,
              private swPush: SwPush) {}

  subscribeToNotification() {
    this.swPush.requestSubscription({
        serverPublicKey: this.VAPID_PUBLIC_KEY
    })
```

```
    .then(sub => this.sendToServer(sub))
    .catch(err => console.error('Could not subscribe to
notifications', err));
  }

  sendToServer(params: any) {
    this.http.post(this.baseUrl, { notification : params
}).subscribe();
  }
}
```

So here we invoke the `requestSubscription` function from SwPush, passing our VAPID public key. If this succeeds we will receive a subscription object which will be sent to our backend. It contains all we need to actually send notifications to this user. A subscription object looks like this:

```
{
 "endpoint": "https://fcm.googleapis.com/fcm/send
/dUbChzYXFSQ:APA91bEcM0UXzo4GPmKtP6jTXtKeHFrJ-
_qhMgNxE_YXfD4jbefA567Wi5Sb183G3pYWQSTzvV40z5k3mpsdheLKBWhBz184cLM
e6uzQ51Qoy3PwBShQSRQonrni8bylHNZrqACEUvUY",
 "expirationTime": null,
 "keys": {
  "p256dh":
"BDEglRj5umJZ8RjSoYc_pgFAYLwMkQye6rhvATWfFyCVjerVmUjMvuHNu2FakpKKo
_fQpk4o9BATOTKlbxb2rfg",
  "auth": "itBJQ5Vep2mU5-whxt43og"
 }
}
```

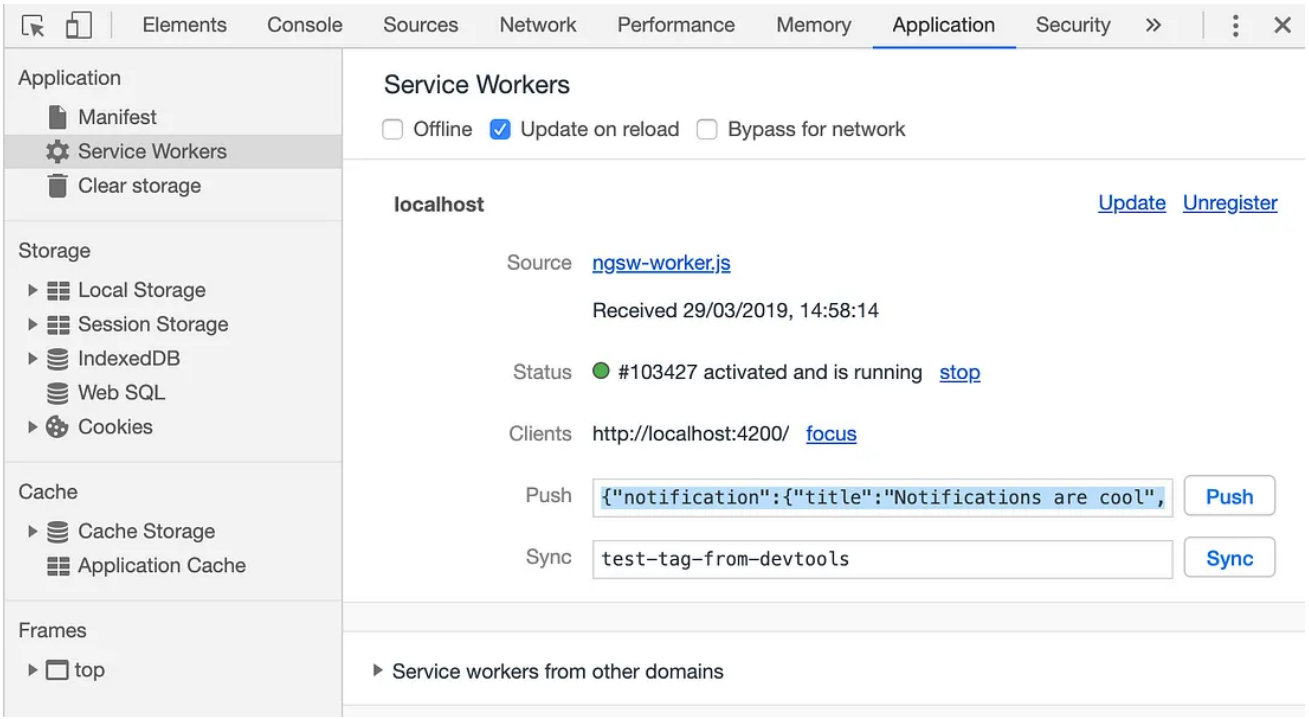
First we have the `endpoint` which our backend should call when sending a push message, followed by the `p256dh` and `auth` keys needed to prove that the user has given permission to receive these messages and we are who we say we are!



User clicks the button, will get a popup asking permission from the browser, and we see the message that permissions were granted

Now that this has been taken care of, and the user has given us his blessing to

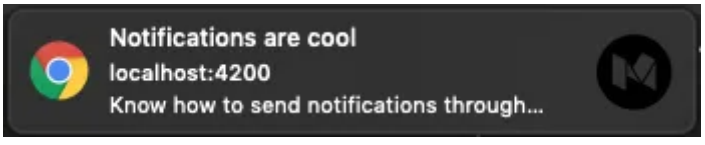
receive our notifications, we're going to send a push message. But as I mentioned earlier in the article, we will mainly focus on the frontend part of things, so how will we test this without a backend? Chrome has already found a solution. In our Development Tools "Application" tab we can inspect the service worker and test from there.



Chrome DevTools "Application" tab

In the "Push" field, we can submit a payload and click the Push button. I've prepared this one:

```
{"notification":{"title":"Notifications are cool","body":"Know how to send notifications through Angular with this article!","icon":"https://www.shareicon.net/data/256x256/2015/10/02/110808_blog_512x512.png","vibrate":[100,50,100],"data":{"url":"https://medium.com/@arjenbrandenburgh/angulars-pwa-swpush-and-swupdate-15a7e5c154ac"}}}
```



Our notification

Hooray! We are receiving our notification. Unfortunately, we are unable to

interact with it: clicking it does nothing. Time for the next step, and hooking into the SwPush `notificationClicks`. We're going to add this snippet to our `app.component.ts`:

```
import { SwPush } from '@angular/service-worker';
(...)
constructor(private swPush: SwPush) {
  this.swPush.notificationClicks.subscribe( event => {
    console.log('Received notification: ', event);
    const url = event.notification.data.url;
    window.open(url, '_blank');
  });
}
```

This time when we click the notification, a page will be opened to our url defined in the push payload.

Great that everything seems to work in our little browser vacuum, but we need a real world solution. Let's connect this to a simple backend! We're going to create a `server.js` file and write our NodeJS server. In my previous article about Progressive Web Apps, I explain why we need to build our frontend and then serve it with `http-server`. We're going to do this now as well, and start our freshly created server (code is slightly more below or on Github).

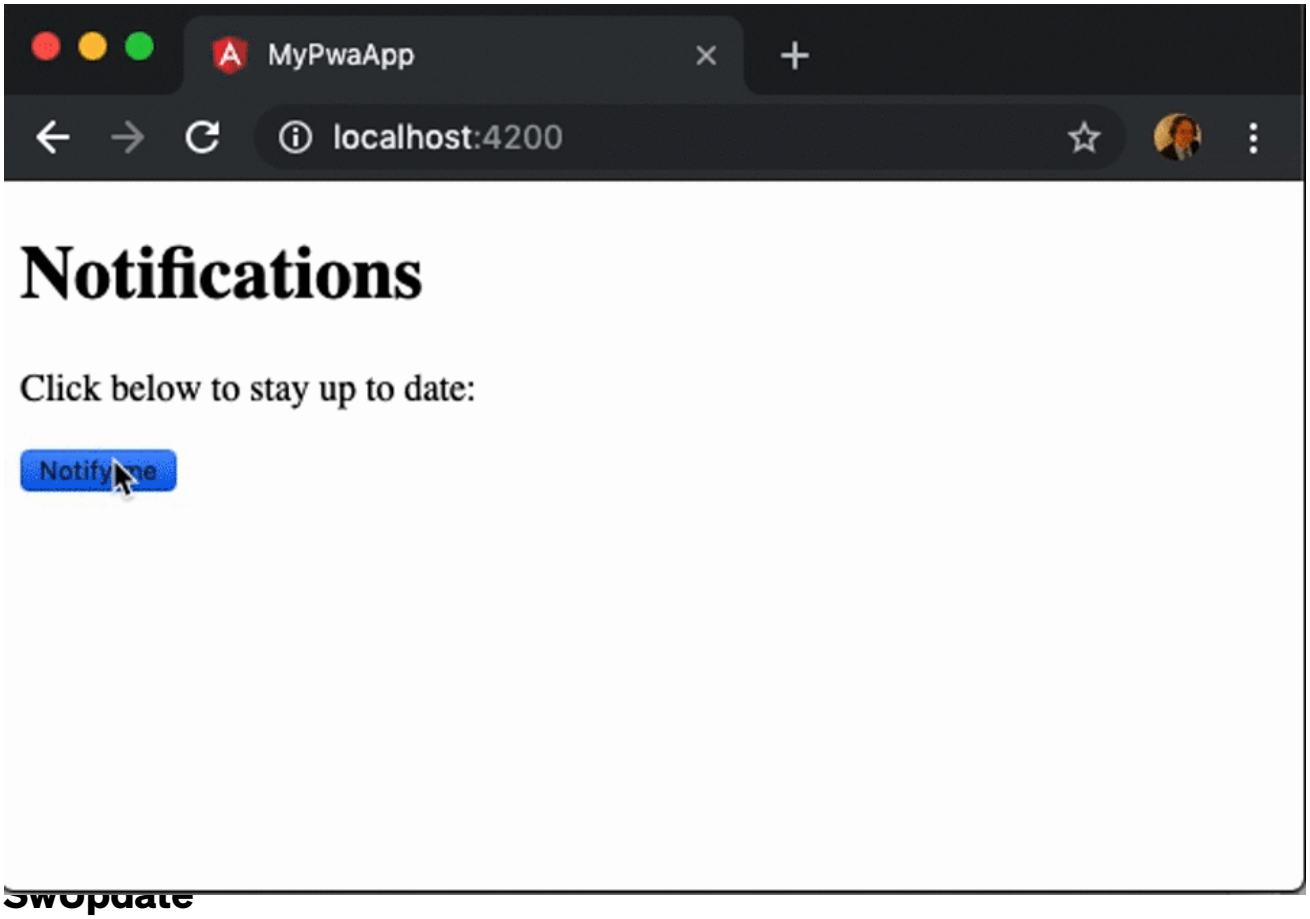
```
npm i -g http-server
ng build --prod
http-server -p4200 -c-1 dist/<name-of-app>

node server/server.js
```

Every time this server receives a new subscription, it will immediately send out a push notification.

```
// server.js
require('dotenv').config({ path: 'variables.env' });

const express = require('express');
const cors = require('cors')
const webPush = require('web-push');
const bodyParser = require('body-parser');
```

```
const app = express();

app.use(cors());

app.use(bodyParser.json());

const publicVapidKey = process.env.PUBLIC_VAPID_KEY;
const privateVapidKey = process.env.PRIVATE_VAPID_KEY;

webPush.setVapidDetails('test@example.com', publicVapidKey,
privateVapidKey);

app.post('/notifications', (req, res) => {
  const subscription = req.body.notification;

console.log(`Subscription received`);

res.status(201).json({});

const payload = JSON.stringify({
    notification: {
      title: 'Notifications are cool',
      body: 'Know how to send notifications through Angular with
this article!',
      icon: 'https://www.shareicon.net/data/256x256/2015/10
/02/110808_blog_512x512.png',
      vibrate: [100, 50, 100],
      data: {
        url: 'https://medium.com/@arjenbrandenburgh/angulars-pwa-
swpush-and-swupdate-15a7e5c154ac'
      }
    }
  });

webPush.sendNotification(subscription, payload)
    .catch(error => console.error(error));
});

app.set('port', process.env.PORT || 5000);
const server = app.listen(app.get('port'), () => {
    console.log(`Express running → PORT
${server.address().port}`);
});
```

In my article about PWAs I've made a small repo on Github showing a basic PWA. I've created a separate branch and pull request to make it easier for everyone to see the changed involved.



Our finished push notification as found on https://github.com/arjenbrandenburgh/medium-pwa-example/blob/feature/swpush

SwUpdate

The SwUpdate can notify us if there's a new version of the service worker available, upon you can take action. We could for example write a component like this:

```
import { Component } from '@angular/core';
import { SwUpdate } from '@angular/service-worker';

@Component({
  selector: 'app-update-component',
  template: `
    <h1>Check for update</h1>
    <p>Click below to check if there's an update available:</p>
    <button (click)="checkForUpdate()">Check for update</button>
  `
})
export class UpdateComponent {
  constructor(private swUpdate: SwUpdate) {
    this.swUpdate.available.subscribe(event => {
      console.log('New update available');
      this.updateToLatest();
    });
  }

  checkForUpdate() {
    if (this.swUpdate.isEnabled) {
```

```
      this.swUpdate.checkForUpdate().then(() => {
          console.log('Checking for updates...');
      }).catch((err) => {
          console.error('Error when checking for update', err);
      });
    }
  }

  updateToLatest(): void {
    console.log('Updating to latest version.');
    this.swUpdate.activateUpdate().then(() =>
document.location.reload());
  }
}
```

What's going on here? We have a button that, when clicked, will tell the service worker to check for a new version in the `checkForUpdate` function. In the constructor we see that we're subscribing to the `swUpdate.available` observable. This observable emits when there's a new update available. When it does, it will invoke `updateTolatest` which will reload the document.

This is not really an elegant solution though. When a user is on your website, it will reload the page by itself and any input will be lost. Also, users shouldn't have to check for updates themselves. This pull request will show you the changes we've made above.

But let's find a better way to let users always have the best experience. On the SwUpdate Angular page we can find a service that will check for an update every 6 hours. Let's use this service!

```
import { ApplicationRef, Injectable } from '@angular/core';
import { SwUpdate } from '@angular/service-worker';
import { concat, interval } from 'rxjs';
import { first } from 'rxjs/operators';

@Injectable()
export class CheckForUpdateService {

  constructor(appRef: ApplicationRef, updates: SwUpdate) {
    // Allow the app to stabilize first, before starting polling
for updates with `interval()`.
    const appIsStable$ = appRef.isStable.pipe(first(isStable =>
isStable === true));
    const everySixHours$ = interval(6 * 60 * 60 * 1000);
    const everySixHoursOnceAppIsStable$ = concat(appIsStable$,
everySixHours$);
```

```
everySixHoursOnceAppIsStable$.subscribe(() =>
updates.checkForUpdate());
  }
}
```

We're going to add a toaster that will notify the user that there's an update, and let them reload themselves whenever they're ready. Our `app.component.ts` now looks like this

```
import { Component } from '@angular/core';
import { SwUpdate } from '@angular/service-worker';
import { CheckForUpdateService } from './services/check-for-
update.service';

@Component({
  selector: 'app-root',
  templateUrl: './app.component.html',
  styleUrls: ['./app.component.css']
})
export class AppComponent {
  title = 'my-pwa-app';
  updateAvailable = false;

constructor(private updates: SwUpdate,
  private checkForUpdateService: CheckForUpdateService) {
    this.updates.available.subscribe((event) => {
      this.updateAvailable = true;
    });
  }
}
```

The `checkForUpdateService` is loaded, and is checking every 6 hours for an update. In the AppComponent constructor we are listening for an update. If it's available, we're toggling a boolean that will show the toaster, and sure enough:

Our toaster notifying the user that there's an update.

If you want to see the full example, you can check out this Github pull request.

Summary

In this article we have gone over the functionality of SwPush and SwUpdate. These two packages can be leveraged to make our PWA more interactive, and to make sure our users are aware of updates. Our users will always have the most recent and optimal experience on our web applications.

We have come a long way when it comes to websites and web applications. Progressive Web Apps are the next step on this beautiful journey. Not only are we able to quickly, and conveniently, show our web application on our users' devices, but we're gaining more and more tools to make our applications more interactive, intuitive and useful. Being able to present our users with information whenever they need it, is nothing short of a little miracle!

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If you think you have what it takes to work with the best, send me an email on arjen.brandenburgh@sytac.io and I'll be happy to tell you more.

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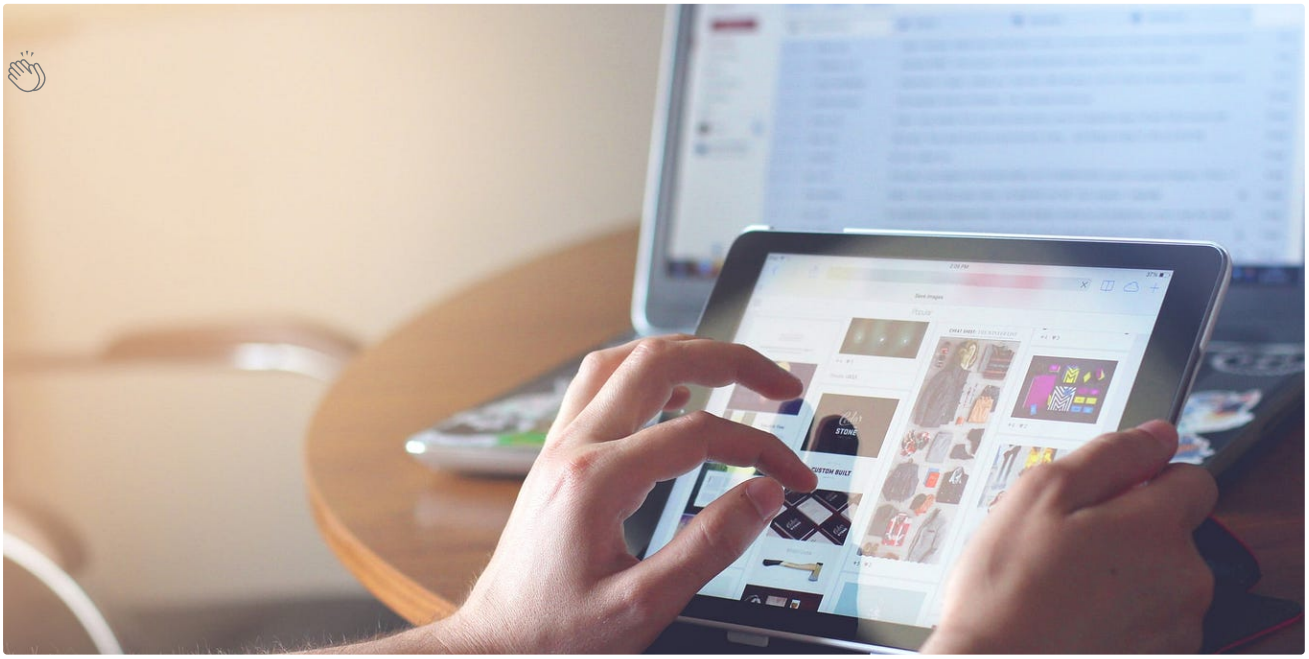

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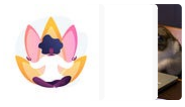

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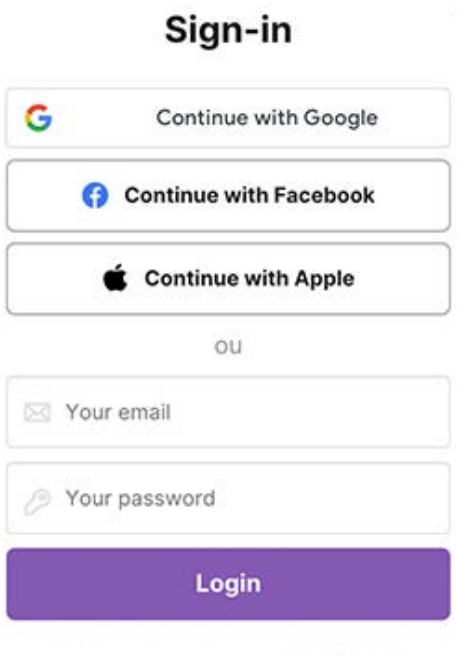

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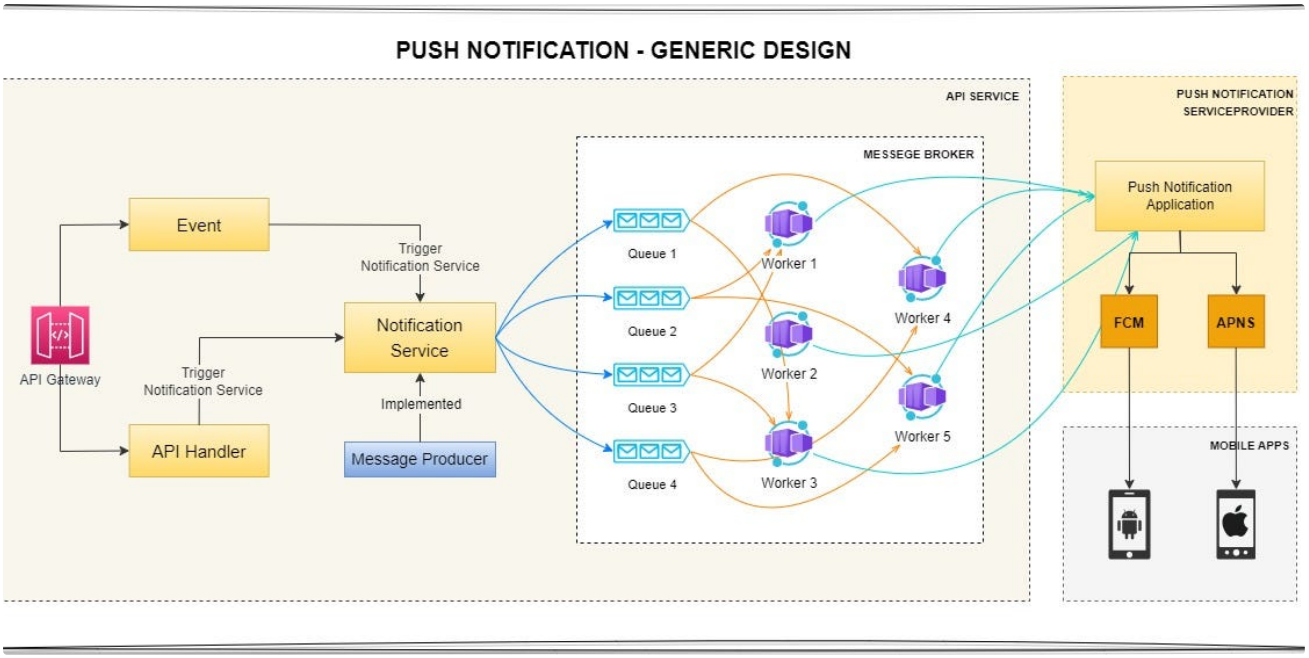

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