

MAD AND PWA LAB

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Experiment – 9

Aim: To implement Service worker events like fetch , sync and push for E-commerce PWA.

Theory:

Service Worker

Service Worker is a script that works on browser background without user interaction independently. Also, It resembles a proxy that works on the user side. With this script, you can track network traffic of the page, manage push notifications and develop "offline first" web applications with Cache API.

Things to note about Service Worker:

- A service worker is a programmable network proxy that lets you control how network requests from your page are handled.
- Service workers only run over HTTPS. Because service workers can intercept network requests and modify responses, "man-in-the-middle" attacks could be very bad.
- The service worker becomes idle when not in use and restarts when it's next needed. You cannot rely on a global state persisting between events. If there is information that you need to persist and reuse across restarts, you can use IndexedDB databases.
- Service workers make extensive use of promises, so if you're new to promises, then you should stop reading this and check out Promises, an introduction.

Fetch Event

You can track and manage page network traffic with this event. You can check existing cache, manage "cache first" and "network first" requests and return a response that you want.

Of course, you can use many different methods but you can find in the following example a "cache first" and "network first" approach. In this example, if the request's and current location's origin are the same (Static content is requested.), this is called "cacheFirst" but if you request a targeted external URL, this is called "networkFirst".

- CacheFirst - In this function, if the received request has cached before, the cached response is returned to the page. But if not, a new response requested from the network.

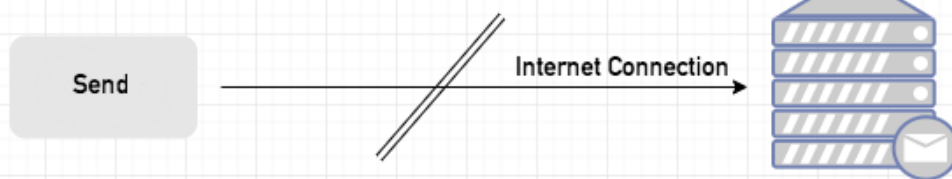
- NetworkFirst - In this function, firstly we can try getting an updated response from the network, if this process completed successfully, the new response will be cached and returned. But if this process fails, we check whether the request has been cached before or not. If a cache exists, it is returned to the page, but if not, this is up to you. You can return dummy content or information messages to the page.

Sync Event

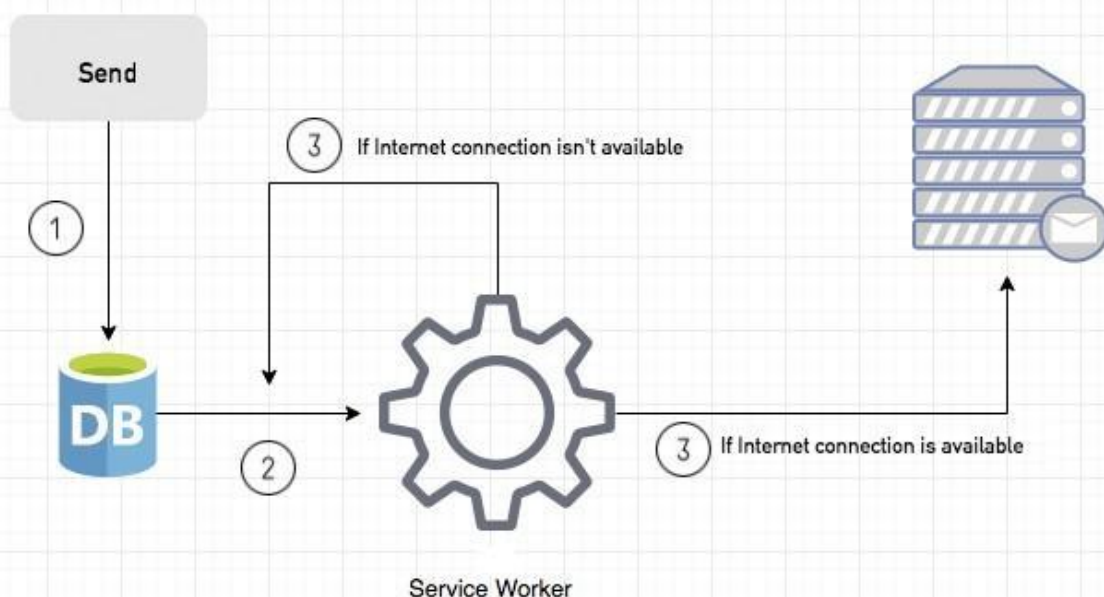
Background Sync is a Web API that is used to delay a process until the Internet connection is stable. We can adapt this definition to the real world; there is an e-mail client application that works on the browser and we want to send an email with this tool. Internet connection is broken while we are writing e-mail content and we didn't realize it. When completing the writing, we click the send button.

Here is a job for the Background Sync.

The following view shows the classical process of sending email to us. If the Internet Connection is broken, we can't send any content to Mail Server.



Here, you can create any scenario for yourself. A sample is in the following for this case.



1. When we click the "send" button, email content will be saved to IndexedDB.
2. Background Sync registration.
3. **If the Internet connection is available**, all email content will be read and sent to Mail Server.

If the Internet connection is unavailable, the service worker waits until the connection is available even though the window is closed. When it is available, email content will be sent to Mail Server.

You can see the working process within the following code block.

Push Event

This is the event that handles push notifications that are received from the server. You can apply any method with received data.

We can check in the following example.

"Notification.requestPermission();" is the necessary line to show notification to the user. If you don't want to show any notification, you don't need this line.

In the following code block is in sw.js file. You can handle push notifications with this event. In this example, I kept it simple. We send an object that has "method" and "message" properties. If the method value is "pushMessage", we open the information notification with the "message" property.

Code:

sw.js

```
self.addEventListener("install", function (event) {
  event.waitUntil(preLoad());
});
self.addEventListener("fetch", function (event) {
  event.respondWith(
    checkResponse(event.request).catch(function () {
      console.log("Fetch from cache successful!");
      return returnFromCache(event.request);
    })
  );
  console.log("Fetch successful!");
  event.waitUntil(addToCache(event.request));
});
self.addEventListener("sync", (event) => {
  if (event.tag === "syncMessage") {
    console.log("Sync successful!");
  }
});
self.addEventListener("push", function (event) {
  if (event && event.data) {
    try {
      var data = event.data.json();
```

```

        if (data && data.method === "pushMessage") {
            console.log("Push notification sent");
            self.registration.showNotification("Twiggy", {
                body: data.message,
            });
        }
    } catch (error) {
        console.error("Error parsing push data:", error);
    }
}
});

var preLoad = function () {
    return caches.open("offline").then(function (cache) {
        // caching index and important routes
        return cache.addAll([
            "/",
            "/index.html",
            "/style.css",
            "/app.js",
            "/blog.html",
            "/about.html",
            "/contact.html",
            "/menu.html",
            "/products.html",
            "/review.html",
            "/script.js",
        ]);
    });
};

var checkResponse = function (request) {
    return new Promise(function (fulfill, reject) {
        fetch(request)
            .then(function (response) {
                if (response.status !== 404) {
                    fulfill(response);
                } else {
                    reject(new Error("Response not found"));
                }
            })
            .catch(function (error) {
                reject(error);
            });
    });
};

var returnFromCache = function (request) {
    return caches.open("offline").then(function (cache) {
        return cache.match(request).then(function (matching) {
            if (!matching || matching.status === 404) {

```

```

        return cache.match("offline.html");
    } else {
        return matching;
    }
    });
});
};

var addToCache = function (request) {
    return caches.open("offline").then(function (cache) {
        return fetch(request).then(function (response) {
            return cache.put(request, response.clone()).then(function () {
                return response;
            });
        });
    });
});
};

```

Output:

Fetch Event

The screenshot displays a web browser window with a website titled "Fast Food Delivery". The website features a navigation bar with links: Home, About, Menu, Products, Review, Contact, and Blog. The main content area shows a large image of a pizza with various toppings. Below the image, there is a text block with placeholder text: "Lorem Ipsum Dolor Sit Amet Consectetur Adipiscing Elit. Incidunt Perferendis Obcaecati Iste Voluptatum, Quamquam Nihil Magnam Numquam Sint?". A button labeled "Order Now" is visible.

On the right side of the browser window, the Chrome DevTools "Service workers" panel is open. It shows the service worker for the URL "http://127.0.0.1:5500/". The status is "Activated and is running". The "Push" event is configured with the method "pushMessage" and the message "Hello, this is". The "Sync" event is configured with the method "syncMessage". The "Periodic Sync" event is configured with the tag "test-tag-from-devtools". The "Update Cycle" section shows the version "8454" and the update activity "Install".

The "Console" panel at the bottom shows the following log messages:

- Fetch successful! (service-worker.js:11)
- Notification permission granted (index.html:31)
- Fetch successful! (service-worker.js:11)
- Service Worker registered with scope: http://127.0.0.1:5500/ (script.js:49)
- Fetch successful! (service-worker.js:11)

Push Event

The screenshot displays a web browser at the address `127.0.0.1:5500/index.html`. The website features a navigation bar with links: Home, About, Menu, Products, Review, Contact, and Blog. The main content area has the heading "Fast Food Delivery" and a placeholder text: "Lorem Ipsum Dolor Sit Amet Consectetur Adipiscing Elit. Incidunt Perferendis Obcaecati Iste Voluptatum, Quaerat Nihil Magnam Numquam Sint?". An "Order Now" button is visible. The background image is a pizza.

The Chrome DevTools Application tab is open, showing the Service Workers section. The service worker is `service-worker.js` at `http://127.0.0.1:5500/`. It is activated and running. The console shows the following log messages:

- Fetch successful! `service-worker.js:11`
- Notification permission granted `index.html:31`
- Fetch successful! `service-worker.js:11`
- Service Worker registered with scope: `http://127.0.0.1:5500/` `script.js:49`
- Fetch successful!
- Push notification sent

A notification bubble from "Twigg" says "Hello, this is Atharva" at `127.0.0.1:5500`.

Sync Event

The screenshot displays the same web browser and website as the previous image. The Chrome DevTools Application tab is open, showing the Service Workers section. The service worker is `service-worker.js` at `http://127.0.0.1:5500/`. It is activated and running. The console shows the following log messages:

- Fetch successful! `service-worker.js:11`
- Notification permission granted `index.html:31`
- Fetch successful! `service-worker.js:11`
- Service Worker registered with scope: `http://127.0.0.1:5500/` `script.js:49`
- Push notification sent `service-worker.js:24`
- Fetch successful! `service-worker.js:11`
- Sync successful! `service-worker.js:16`

Conclusion:

In this experiment, we have successfully implemented service worker events like fetch, sync and push for E-commerce PWA and found out output for above implementation.