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D15B

EXPERIMENT NO. 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".

```
self.addEventListener("fetch", function (event) {
    const req = event.request;
    const url = new URL(req.url);

    if (url.origin === location.origin) {
        event.respondWith(cacheFirst(req));
    }
    else {
        event.respondWith(networkFirst(req));
    }
});

async function cacheFirst(req) {
    return await caches.match(req) || fetch(req);
}

async function networkFirst(req) {
    const cache = await caches.open("pwa-dynamic");
    try {
        const res = await fetch(req);
        cache.put(req, res.clone());
        return res;
    } catch (error) {
        const cachedResponse = await cache.match(req);
        return cachedResponse || await caches.match("./noconnection.json");
    }
}
```

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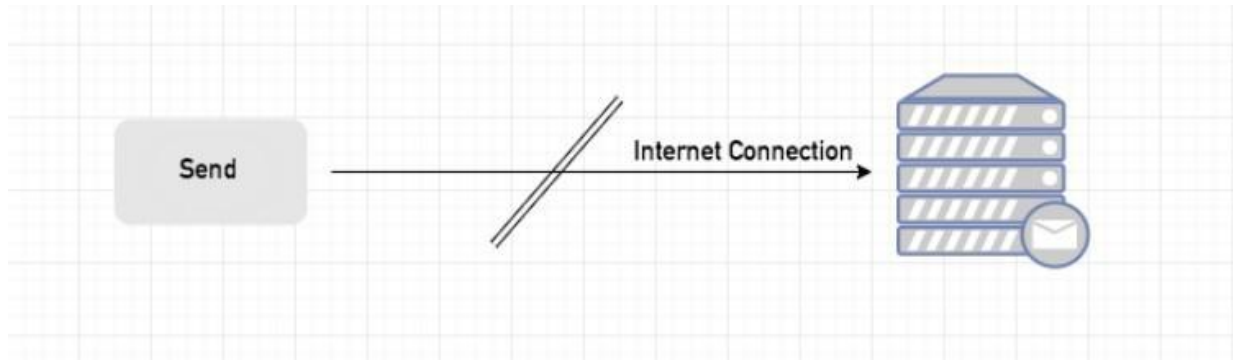
Here, you can create any scenario for yourself. A sample is in the following for this case.

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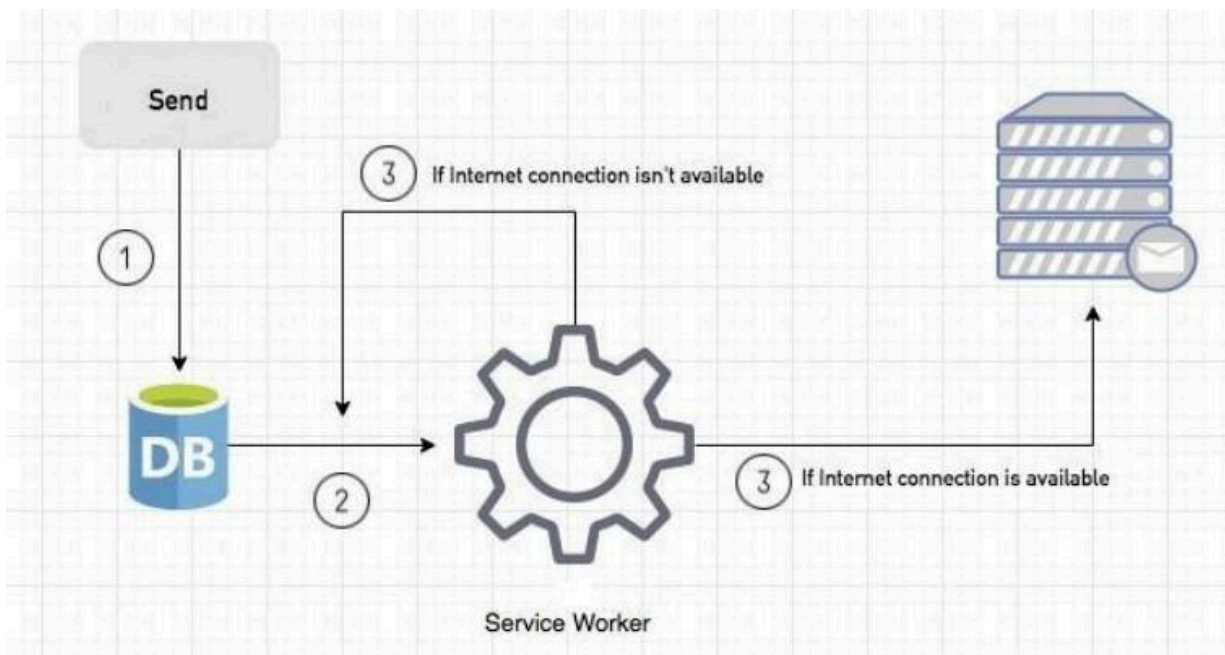
1. When we click the "send" button, email content will be saved to IndexedDB.
2. Background Sync registration.
3.   If the Internet connection is available, all email content will be read and sent to Mail Server. If the Internet connection is unavailable, the service worker waits until the connection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

 Event Listener for Background Sync Registration

```
document.querySelector("button").addEventListener("click", async () => {
    var swRegistration = await navigator.serviceWorker.register("sw.js");
    swRegistration.sync.register("helloSync").then(function () {
        console.log("helloSync success [main.js]");
    });
});
```

Event Listener for sw.js

```
self.addEventListener('sync', event => {
    if (event.tag == 'helloSync') {
        console.log("helloSync [sw.js]");
    }
});
```

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.

```
self.addEventListener('push', event => {
    if (event && event.data) {
        var data = event.data.json();
        if (data.method === "pushMessage") {
            event.waitUntil(self.registration.showNotification("Test App", {
                body: data.message
            }));
        }
    }
});
```

You can use Application Tab from Chrome Developer Tools for testing push notification.
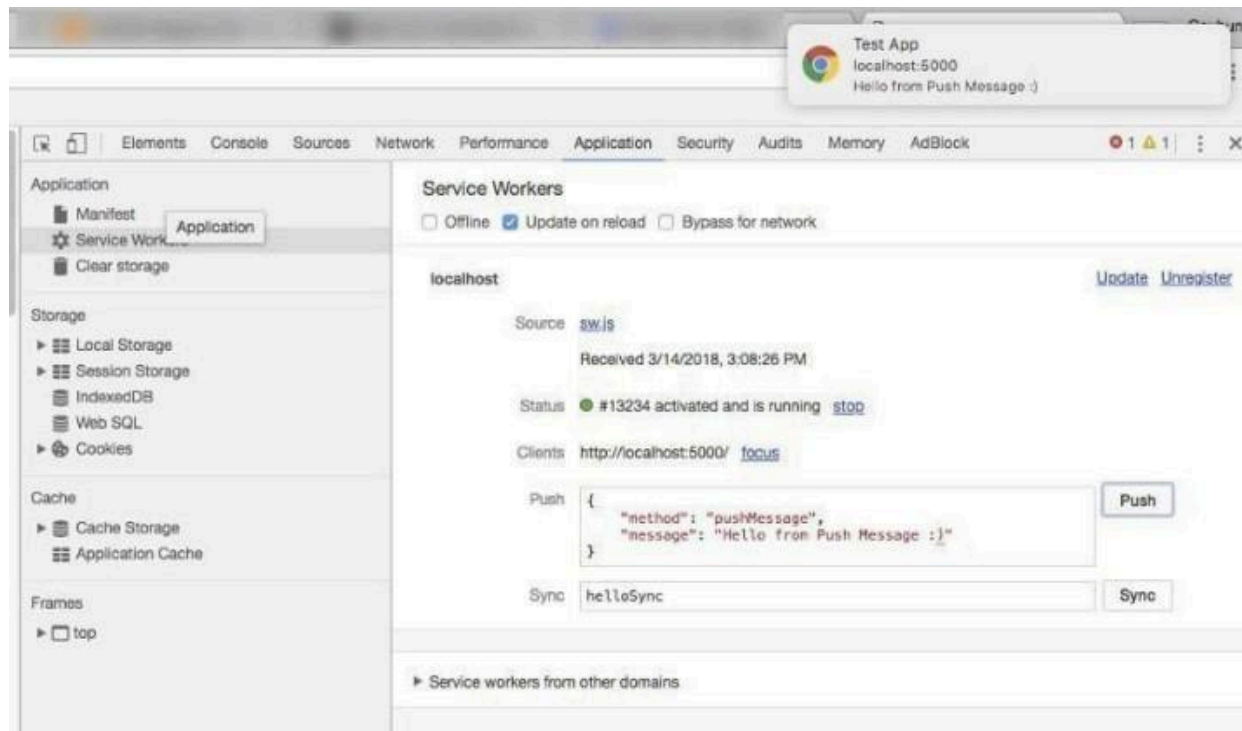
Code: sw.js

```
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') {
```

```javascript
      console.log("Sync successful!")
  }
});

self.addEventListener('push', function (event) {
  if (event && event.data) {
    var data = event.data.json();
    if (data.method == "pushMessage") {
      console.log("Push notification sent");
      event.waitUntil(self.registration.showNotification("Omkar Sweets Corner", { body:
        data.message
      }))
    }
  }
})


var filesToCache = [
  '/',
  '/menu',
  '/contactUs',
  '/offline.html',
];
```

```javascript
var preLoad = function () {
  return  caches.open("offline").then(function (cache) {
    // caching index and important routes
    return cache.addAll(filesToCache);
  });
};

var checkResponse = function (request) { return
  new Promise(function (fulfill, reject) {
    fetch(request).then(function (response) {
      if (response.status !== 404) {
        fulfill(response);
      } else {
        reject();
```

```
    }
}, reject);
});
};


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


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;
    }
  });
});
};
```

Fetch

event:

	Clients	http://127.0.0.1:5500/ focus	
	Push	{"method":"pushMessage","message":"He	Push
	Sync	test-tag-from-devtools	Sync
	Periodic Sync	test-tag-from-devtools	Periodic Sync

Storage
- ▶ ⊞ Local storage
- ▶ ⊞ Session storage
- ⊟ IndexedDB
- ⊟ Web SQL
- ▶ ◌ Cookies
- ⊟ Private state t
- ⊟ Interest group
- ▶ ⊟ Shared storag
- ▼ ⊟ Cache storage
  - ⊞ offline - htt
  - ⊞ dynamic-pv

Background services ▼

Update Cycle

Version	Update Activity	Timeline
▶ #43	Install	
▶ #43	Wait	
▶ #43	Activate	

Service workers from other origins

Console | Issues | +

▣ ⊘ top ▼ ◉ Filter | Default levels ▼ ● 4 ⚙

```
Fetch successful (from network, cached): http://127.0.0.1:5500/styles.css     sw.js:93
Fetch successful (from cache): http://127.0.0.1:5500/styles.css               sw.js:65
Fetch successful (from network, cached): http://127.0.0.1:5500/script.js      sw.js:93
Fetch successful (from cache): http://127.0.0.1:5500/script.js                sw.js:65
```

Sync event

Our Skincare Products

Lanaige lip Mask

Cosrx Snail mucin
Get Glass skin in one go.

Paulas choice BHA
Super cleanse your skin

Console

▣ ⊘ top ▼ ◉ Filter | Default levels ▼ ● 4 ⚙

```
Service worker registration successful: http://127.0.0.1:5500/
helloSync success [script.js]
helloSync [sw.js]
```

Push event

Conclusion : We have successfully understood and implemented events like fetch , push and sync for our ecommerce pwa.