

Aim: To code and register a service worker, and complete the install and activation process for a new service worker for the 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

What can we do with Service Workers?

You can dominate **Network Traffic**

You can manage all network traffic of the page and do any manipulations. For example, when the page requests a CSS file, you can send plain text as a response or when the page requests an HTML file, you can send a png file as a response. You can also send a true response too.

- You can **Cache**

You can cache any request/response pair with Service Worker and Cache API and you can access these offline content anytime.

- You can manage **Push Notifications**

You can manage push notifications with Service Worker and show any information message to the user.

- You can **Continue**

Although Internet connection is broken, you can start any process with Background Sync of Service Worker.

What can't we do with Service Workers?

- You can't access the Window You can't access the window, therefore, You can't manipulate DOM elements. But, you can communicate to the window through post Message and manage processes that you want.
- You can't work it on 80 Port Service Worker just can work on HTTPS protocol. But you can work on localhost during development.

A service worker goes through three steps in its life cycle:

- Registration
- Installation
- Activation

Registration

To install a service worker, you need to register it in your main JavaScript code. Registration tells the browser where your service worker is located, and to start installing it in the background. Let's look at an example:

```
script.js

if ('serviceWorker' in navigator) {

  navigator.serviceWorker.register
  ('/service-worker.js') .
  then(function(registration) {
    console.log('Registration successful, scope is:', registration.scope);
  })
  .catch(function(error) {
    console.log('Service worker registration failed, error:', error);
  });
}
```

This code starts by checking for browser support by examining **navigator.serviceWorker**. The service worker is then registered with `navigator.serviceWorker.register`, which returns a promise that resolves when the service worker has been successfully registered. The scope of the service worker is then logged with `registration.scope`. If the service worker is already installed, `navigator.serviceWorker.register` returns the registration object of the currently active service worker.

The scope of the service worker determines which files the service worker controls, in other words, from which path the service worker will intercept requests. The default scope is the location of the service

worker file, and extends to all directories below. So if service-worker.js is located in the root directory, the service worker will control requests from all files at this domain.

You can also set an arbitrary scope by passing in an additional parameter when registering.

For example:

```
script.js
```

```
navigator.serviceWorker.register
```

```
('/serviceworker.js', { scope: '/app/' });
```

In this case we are setting the scope of the service worker to /app/, which means the service worker will control requests from pages like /app/, /app/lower/ and /app/lower/lower, but not from pages like /app or /, which are higher.

If you want the service worker to control higher pages e.g. /app (without the trailing slash) you can indeed change the scope option, but you'll also need to set the Service-Worker-Allowed HTTP Header in your server config for the request serving the service worker script.

```
script.js
```

```
navigator.serviceWorker.register
```

```
('/app/service-worker.js', { scope: '/app' });
```

Installation

Once the browser registers a service worker, installation can be attempted. This occurs if the service worker is considered to be new by the browser, either because the site currently doesn't have a registered service worker, or because there is a byte difference between the new service worker and the previously installed one.

A service worker installation triggers an install event in the installing service worker. We can include an install event listener in the service worker to perform some task when the service worker installs. For instance, during the install, service workers can precache parts of a web app so that it loads instantly the next time a user opens it (see caching the application shell). So, after that first load, you're going to benefit from instant repeat loads and your time to interactivity is going to be even better in those cases. An example of an installation event listener looks like this:

```
service-worker.js
// Listen for install event, set callback
self.addEventListener('install', function(event) {
  // Perform some task
});
```

Activation:

Once a service worker has successfully installed, it transitions into the activation stage. If there are any open pages controlled by the previous service worker, the new service worker enters a waiting state. The new service worker only activates when there are no longer any pages loaded that are still using the old service worker. This ensures that only one version of the service worker is running at any given time.

```
service-worker.js
self.addEventListener('activate', function(event) {
  // Perform some task
});
```

Code :

```
<script src="script.js">
  window.addEventListener('load', () => {
    registerSW();
  });

  // Register the Service Worker
  async function registerSW() {
    if ('service' in navigator) {
      try {
        await navigator
          .serviceWorker
          .register('service.js');
      }
      catch (e) {
        console.log('SW registration failed');
      }
    }
  }
</script>
```

serviceworker.js:

```
// Service Worker File

// Define the cache name
var CACHE_NAME = 'kids-fs-cache-v1';

// Define the files to be cached
var urlsToCache = [
  '/',
  '/index.html',
  '/style.css',
  '/script.js',
  '/manifest.json',
  // Add more files to be cached as needed
];

// Install the service worker and cache the static assets
self.addEventListener('install', function(event) {
  event.waitUntil(
    caches.open(CACHE_NAME)
      .then(function(cache) {
        console.log('Opened cache');
        return cache.addAll(urlsToCache);
      })
  );
});

// Fetch event - serve assets from cache if available, otherwise fetch from
// network
self.addEventListener('fetch', function(event) {
  event.respondWith(
    caches.match(event.request)
      .then(function(response) {
        // Cache hit - return response
        if (response) {
          return response;
        }
        // Clone the request to avoid consuming it
        var fetchRequest = event.request.clone();
```

```
        // Fetch from network
        return fetch(fetchRequest).then(
            function(response) {
                // Check if valid response
                if(!response || response.status !== 200 || response.type
!= 'basic') {

                    return response;
                }

                // Clone the response
                var responseToCache = response.clone();

                // Open cache and add the response
                caches.open(CACHE_NAME)
                    .then(function(cache) {
                        cache.put(event.request, responseToCache);
                    });

                return response;
            }
        );
    });

    // Activate event - clean up old caches
    self.addEventListener('activate', function(event) {
        event.waitUntil(
            caches.keys().then(function(cacheNames) {
                return Promise.all(
                    cacheNames.filter(function(cacheName) {
                        // Delete old cache
                        return cacheName.startsWith('kids-fs-cache-') && cacheName
!= CACHE_NAME;
                    }).map(function(cacheName) {
                        return caches.delete(cacheName);
                    })
                );
            })
        );
    });
};
```

OutPut :

1.Cache:

The screenshot shows the Chrome DevTools Application panel with the 'Cache storage' section selected. The left sidebar lists various storage areas, including 'Cache storage'. The main panel displays the cache for the origin `http://127.0.0.1:5500`. It shows a list of cached entries with columns for Name, Response, Content, Content, Time, and Vary. The entries are:

#	Name	Response...	Content...	Content...	Time Cac...	Vary Hea...
0	/	basic	text/html	5,051	25/3/202...	Origin
1	/index.html	basic	text/html	5,051	25/3/202...	Origin
2	/manifest.json	basic	applicati...	1,126	25/3/202...	Origin
3	/script.js	basic	applicati...	2,086	25/3/202...	Origin
4	/style.css	basic	text/css	4,456	25/3/202...	Origin

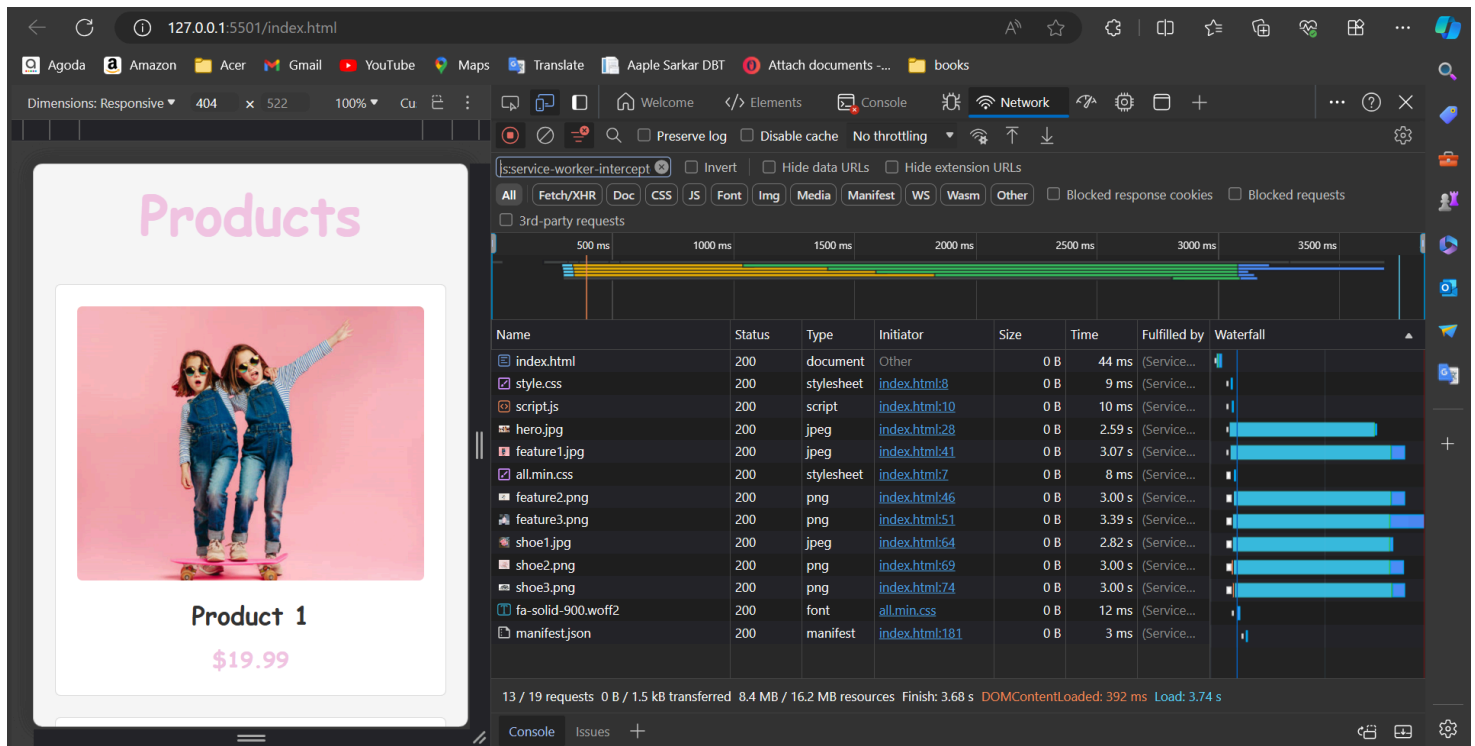
The total entries are 5.

2. Serviceworker :

The screenshot shows the Chrome DevTools Application panel with the 'Service workers' section selected. The left sidebar lists various storage areas, including 'Service workers'. The main panel displays the service workers for the origin `http://127.0.0.1:5500/`. It shows a list of service workers with columns for Source, Received, Status, and Update Cycle. The service worker is `service.js`, received on 25/3/2024 at 8:37:29 pm, and is currently active. The update cycle shows a timeline with install, wait, and activate phases.

Service workers from other origins: [See all registrations](#)

3. Offline :



Conclusion : In conclusion, it's vital to thoroughly test the offline functionality of a Progressive Web App (PWA) to ensure a seamless user experience, particularly in situations where internet connectivity might be unreliable or unavailable. By simulating offline scenarios and testing how the app behaves without an internet connection, including aspects like service worker registration, resource caching, and progressive enhancement, developers can ensure that the app remains functional and user-friendly even when users are offline. This helps in providing a reliable and consistent experience to users regardless of their internet status.