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.

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.

```
if ('service' in navigator) {
            try {
              await navigator
                    .serviceWorker
                    .register('service.js');
            }
            catch (e) {
              console.log('SW registration failed');
            }
          }
        }
```

script.js

navigator.serviceWorker.register
('/serviceworker.js', { scope: '/app/' }); I

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.

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.

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
});

```
<script src="/script.js">
    window.addEventListener('load',() =>{
        async function registerSW(){
            try{
                await navigator.serviceWorker.register('/service.js');
            }
                catch (e){
                    console.log('SW registration failed')
                }
        }
    }
    )
</script>
```

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

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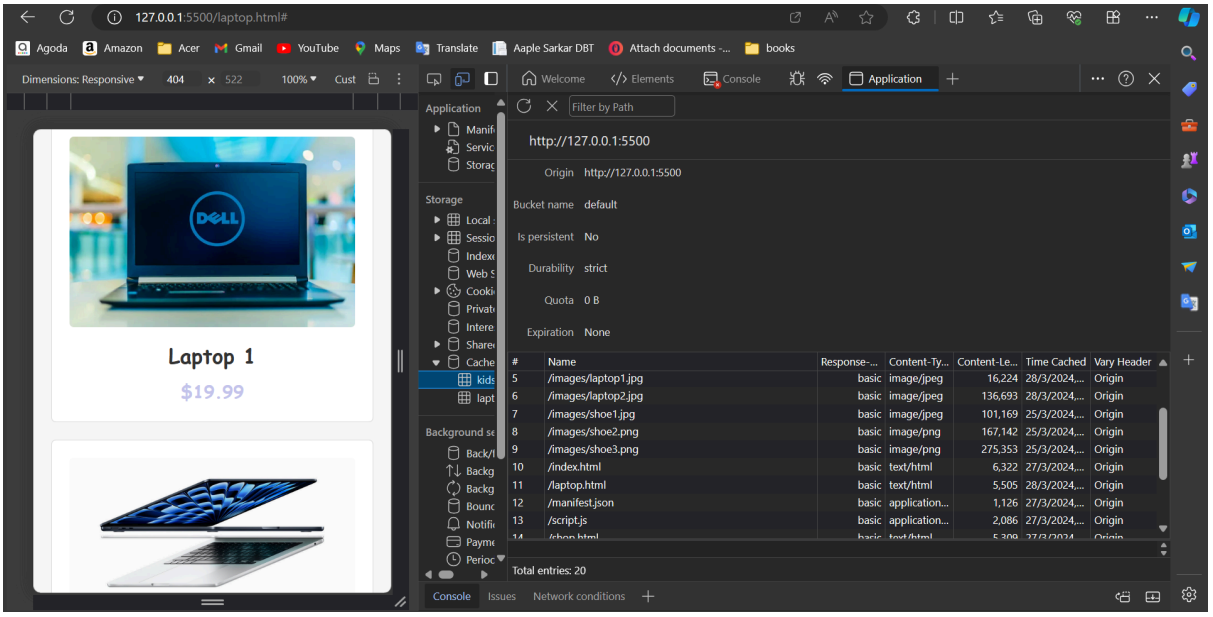
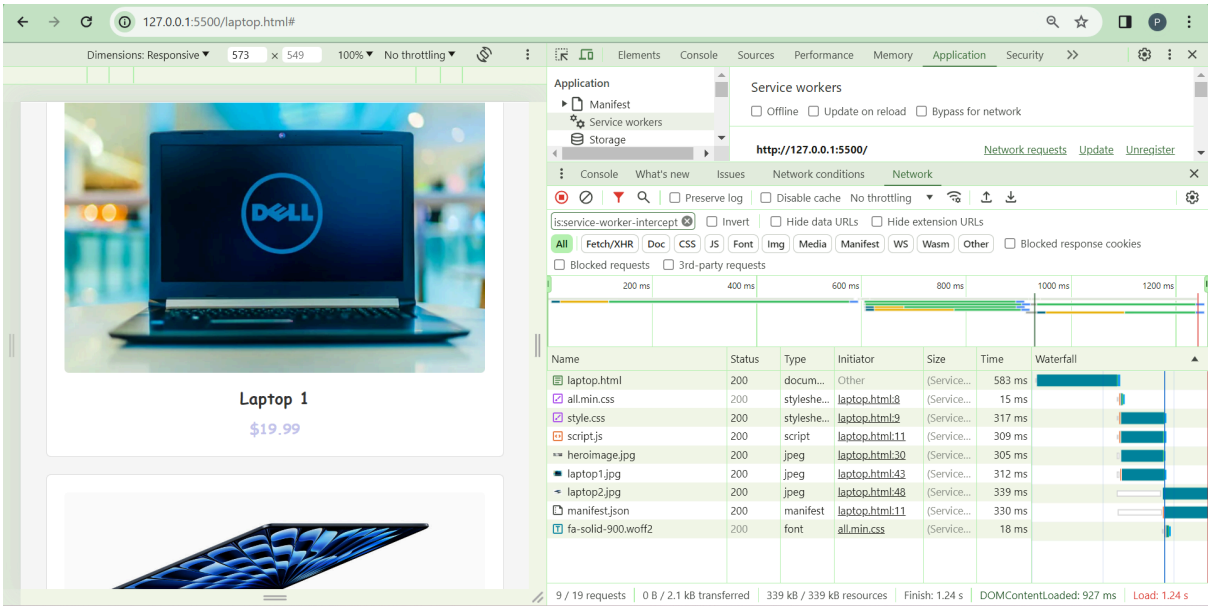
Output :



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.