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Class: TE-ITA/B, Semester: VI
Subject: **MAD & PWA LAB**

Experiment – 9: Registration, Installation and Activation of Service worker for Ecommerce PWA

1. **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.
2. **Objectives:** After study of this experiment, the student will be able to
 - Develop responsive web applications by combining AJAX development techniques with the jQuery JavaScript library.
 - Understand how service workers operate.
3. **Outcomes:** After study of this experiment, the student will be able to
 - Understand various PWA frameworks and their requirements.
 - Design and Develop a responsive User Interface by applying PWA Design techniques.
4. **Prerequisite:** HTML/ CSS/ JavaScript.
5. **Requirements:** Visual Studio Code, Bootstrap framework, Internet Connection.

6. Pre-Experiment Exercise:

Brief Theory:

Service Worker

A service worker is a script that runs in the background of your web application. It doesn't need the DOM and in fact doesn't even have access to the DOM. Service workers run in a separate thread from the UI, so they don't block or freeze the UI while they process. They only work on HTTPS. The service worker acts as an intermediary between your app and the Internet. It then performs whatever function you've set it up to perform, and finally communicates some result back to your app by passing messages. Figure shows architecture of service worker.

A service worker accomplishes:

1. Caching assets like images, scripts, or styles
2. Caching entire pages
3. Syncing an app that was offline once its Internet connection comes back to life
4. Push notifications

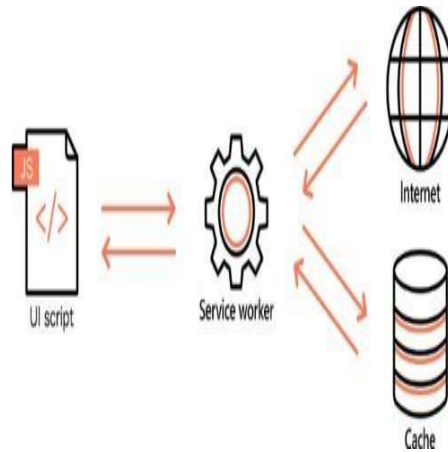


Figure: Service worker architecture.

Service Worker Lifecycle

The main parts of the service worker lifecycle.

1. Registration and downloading
2. Installation
3. Waiting (sometimes)
4. Activation
5. Updating

The first thing you do to create your first service worker is register it. This will download your service worker script. Then in a script called `service-worker.js`, you listen for the `install` and `activate` events, the other two parts of the lifecycle. Finally, you just need to reference your script in an `index.html` file.

There are cases where this path takes a few detours when you update the service worker

7. Laboratory Exercise

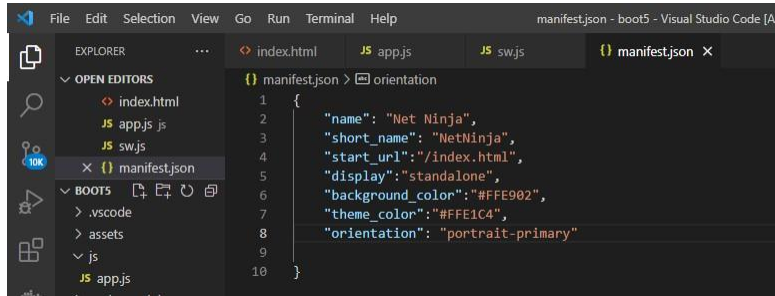
A. Program

1. Register a service worker, and complete the install and activation process for a new service worker for the E-commerce PWA.

B. Result/Observation

1. Print out of program code and output.

Create a manifest file



```
File Edit Selection View Go Run Terminal Help
manifest.json - boot5 - Visual Studio Code [Administrator]

EXPLORER
index.html
JS app.js
JS sw.js
manifest.json

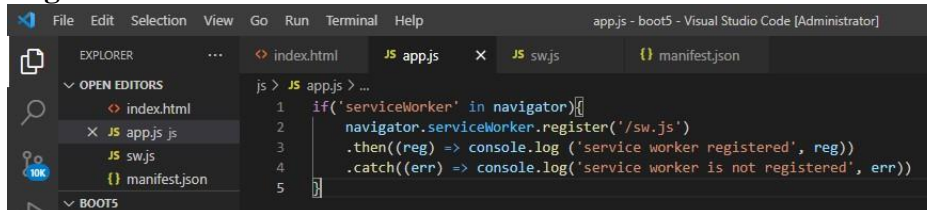
OPEN EDITORS
index.html
JS app.js
JS sw.js
manifest.json

BOOTS
.vscode
assets
js
app.js

manifest.json
1 {
2   "name": "Net Ninja",
3   "short_name": "NetNinja",
4   "start_url": "/index.html",
5   "display": "standalone",
6   "background_color": "#FFE002",
7   "theme_color": "#FFE1C4",
8   "orientation": "portrait-primary"
9 }
10 }
```

Create app.js and sw.js(serviceworker)

Register the serviceworker



```
File Edit Selection View Go Run Terminal Help
app.js - boot5 - Visual Studio Code [Administrator]

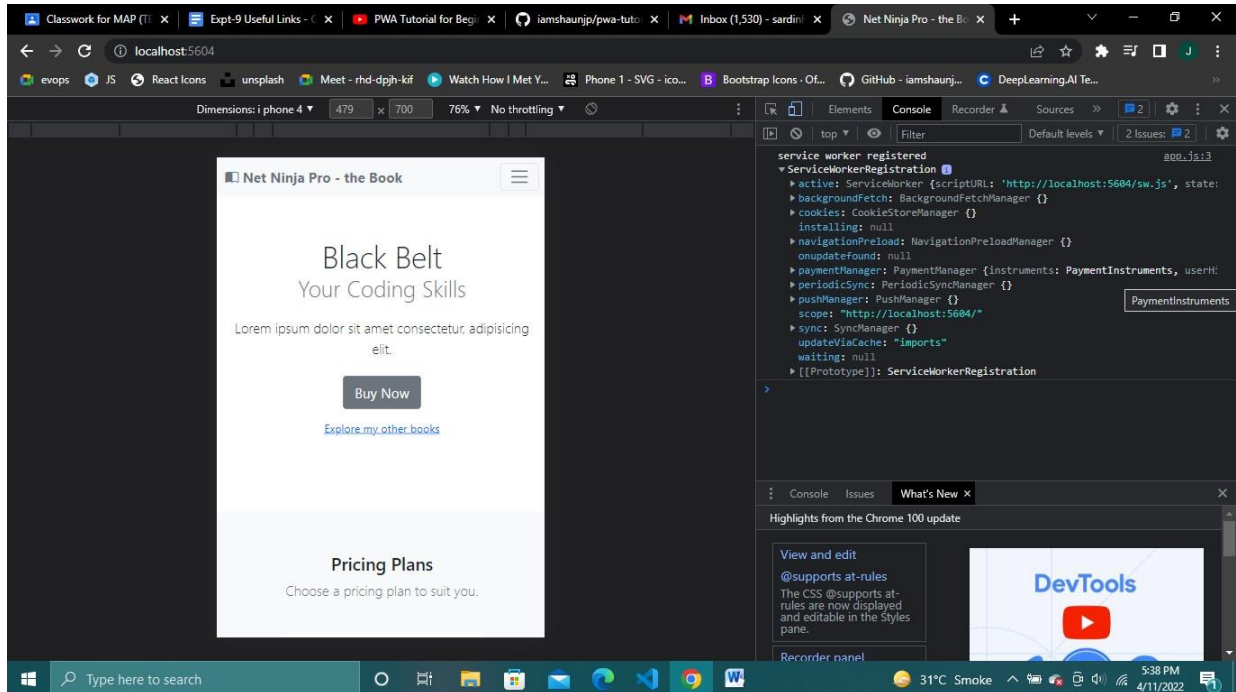
EXPLORER
index.html
JS app.js
JS sw.js
manifest.json

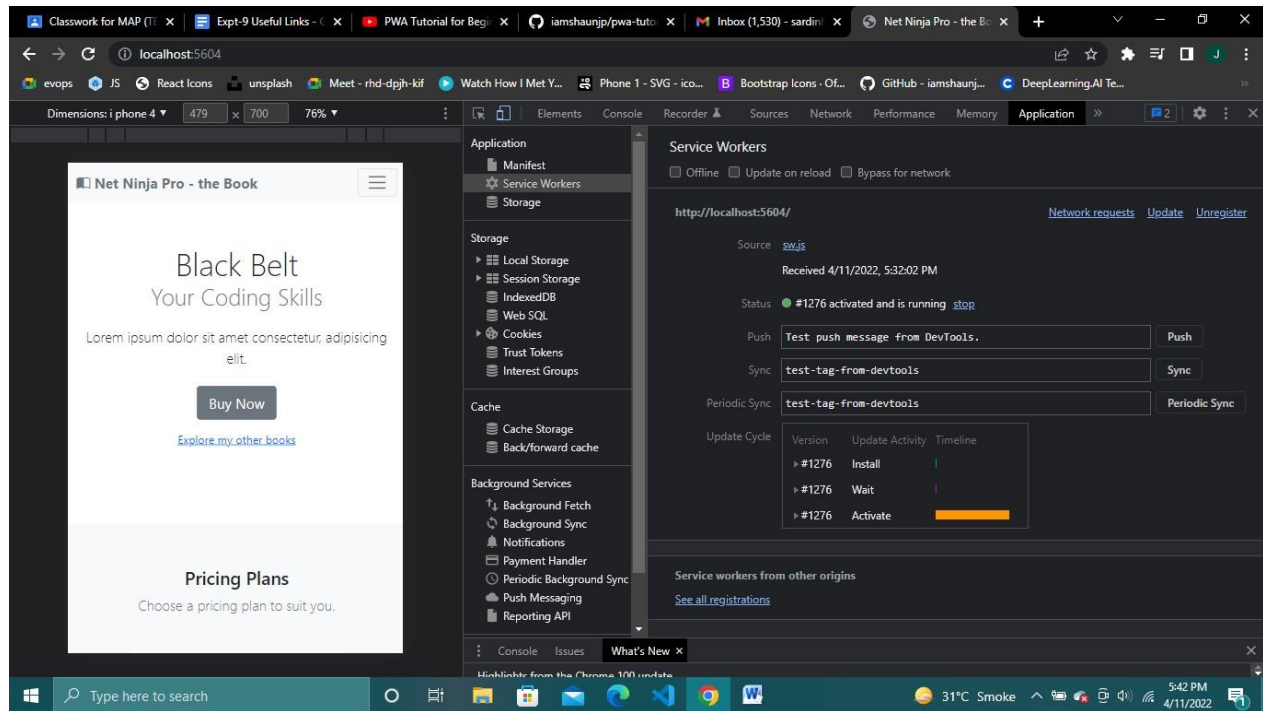
OPEN EDITORS
index.html
JS app.js
JS sw.js
manifest.json

BOOTS
js
app.js
sw.js
manifest.json

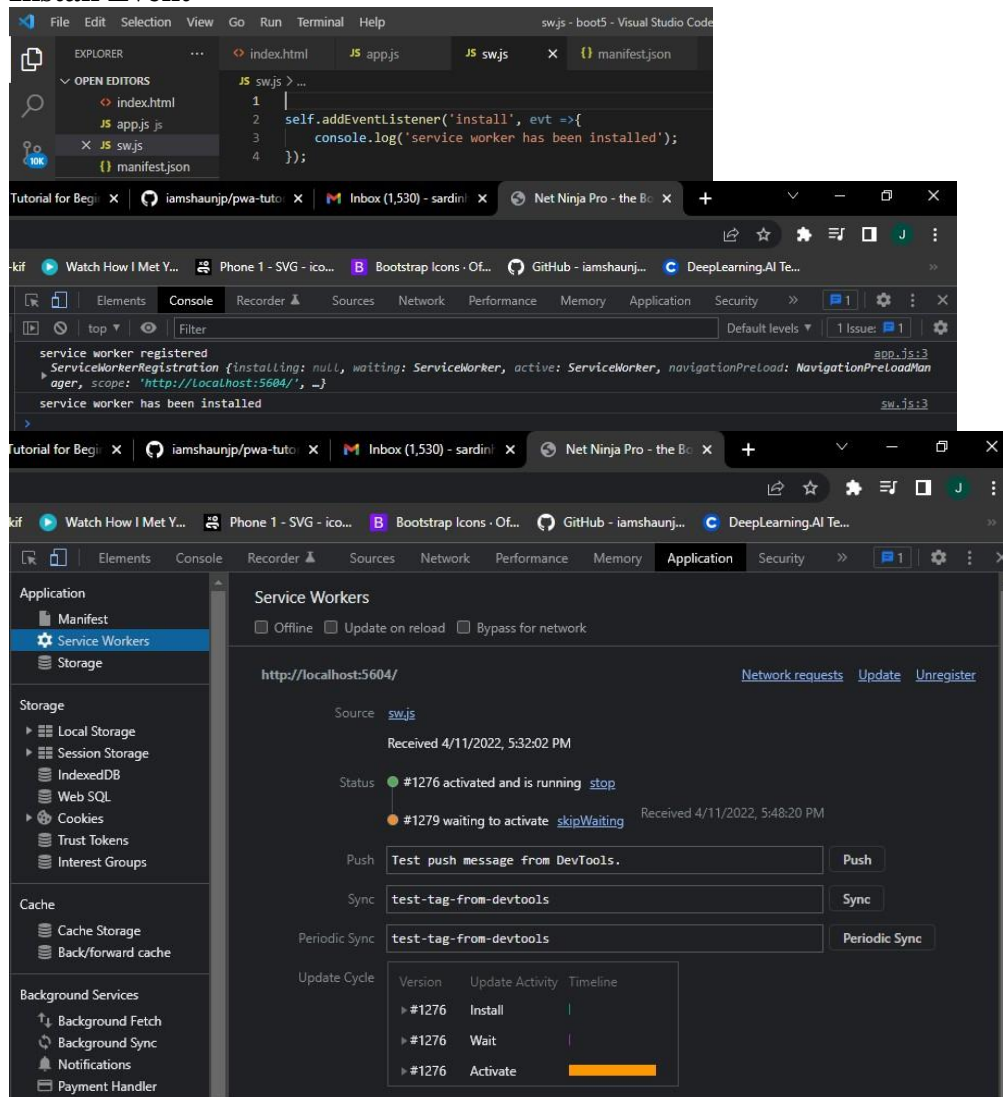
app.js
1 if('serviceWorker' in navigator){
2   navigator.serviceWorker.register('/sw.js')
3   .then((reg) => console.log('service worker registered', reg))
4   .catch((err) => console.log('service worker is not registered', err))
5 }
```

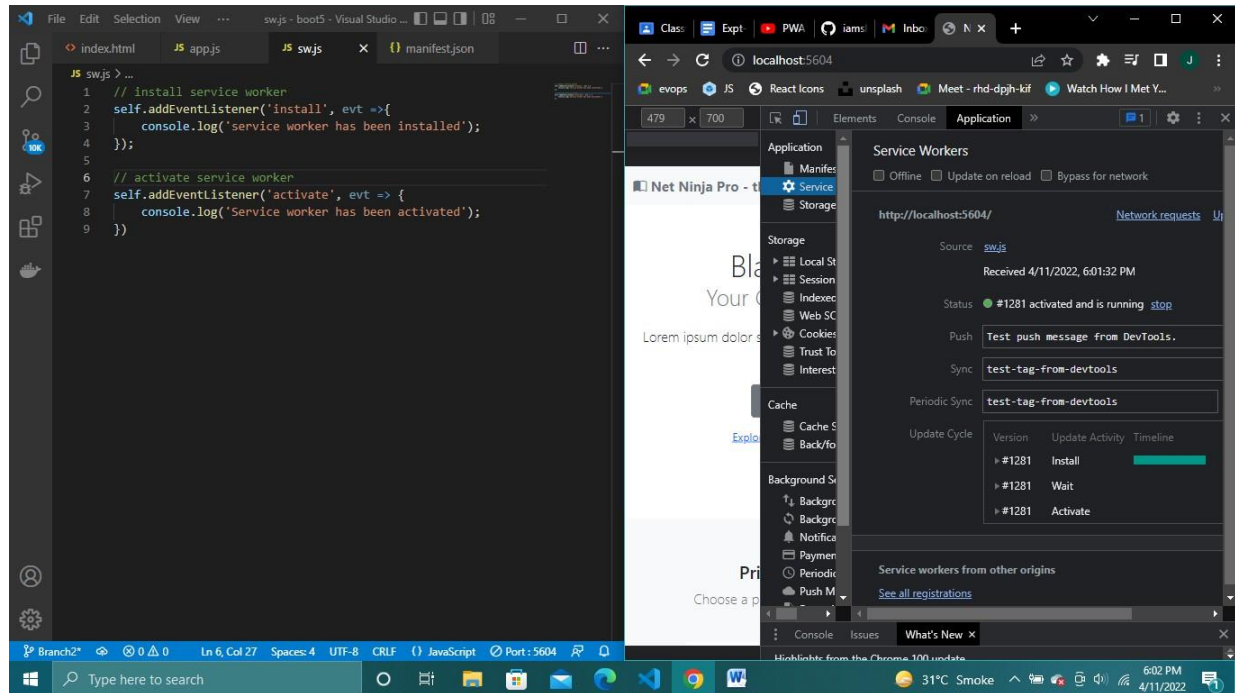
Reload and check console



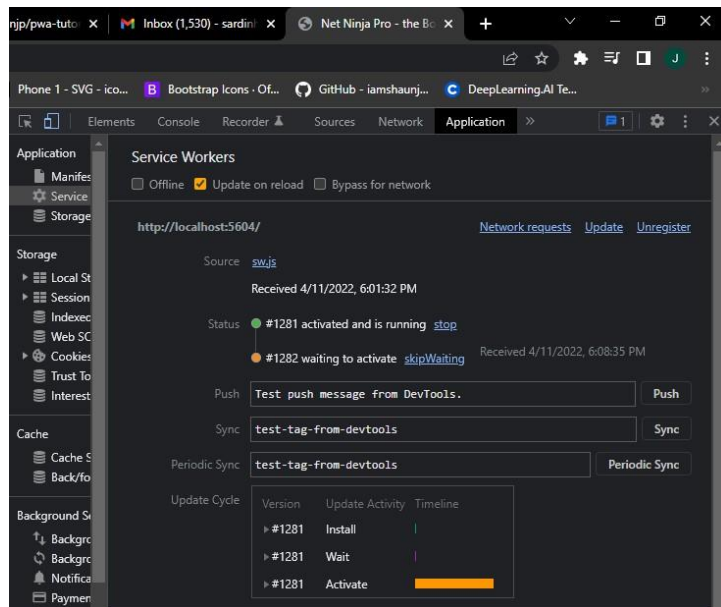


Install Event

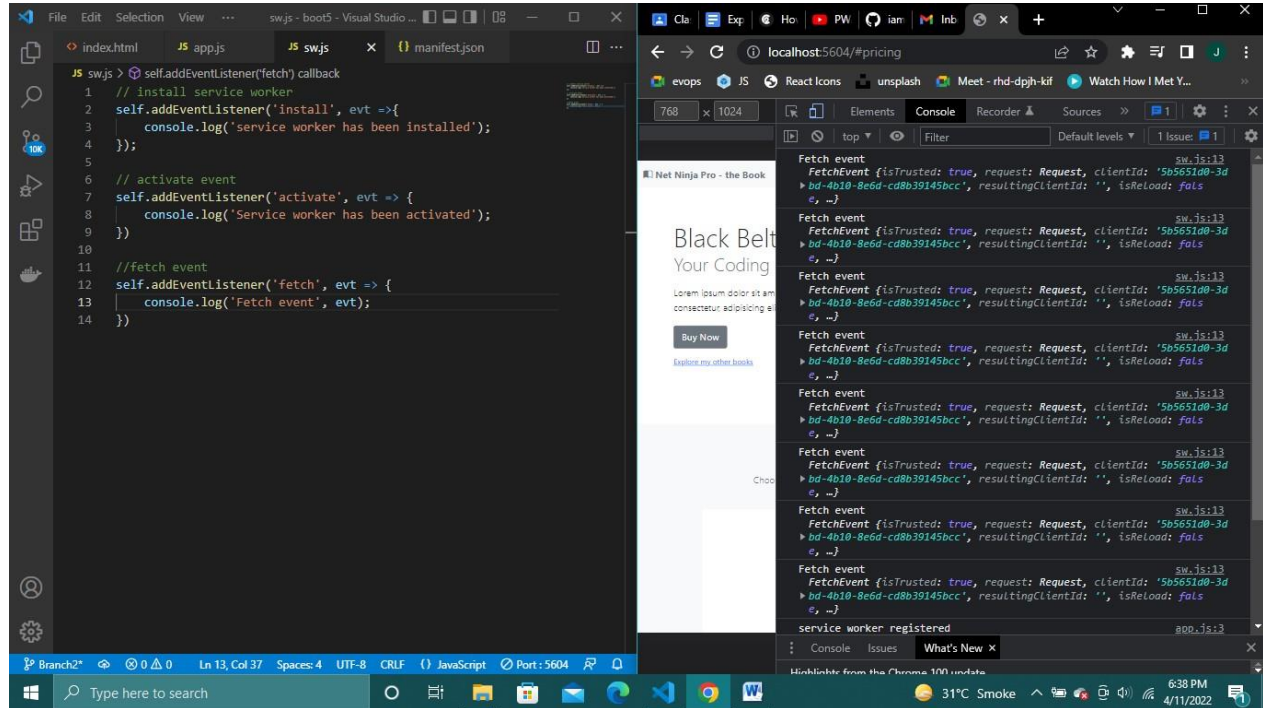




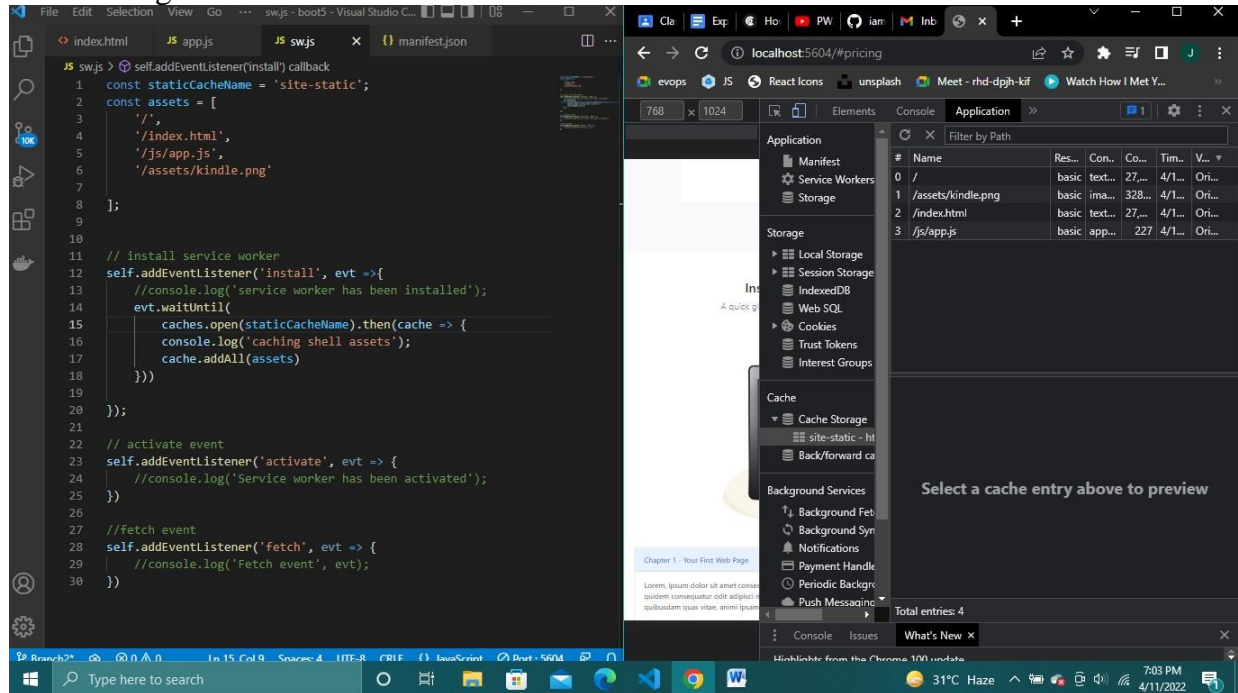
When we make changes to `sw.js` file service worker goes into waiting state. Enable 'Update on Reload' to avoid this.



Fetch event



Pre Caching assets



Getting cached assets

The screenshot displays a development environment with Visual Studio Code and a web browser. The Visual Studio Code editor shows a file named `sw.js` with the following JavaScript code:

```
1 const staticCacheName = 'site-static';
2 const assets = [
3   '/',
4   '#intro',
5   '/index.html',
6   '/js/app.js',
7   '/assets/kindle.png',
8   '/assets/ebook-cover.png',
9   'https://cdn.jsdelivr.net/npm/bootstrap@5.1.3/dist/css/bootstrap.min.css',
10  'https://cdn.jsdelivr.net/npm/bootstrap@5.1.3/dist/js/bootstrap.bundle.min.js'
11 ];
12
13 // install service worker
14 self.addEventListener('install', evt => {
15   //console.log('service worker has been installed');
16   evt.waitUntil(
17     caches.open(staticCacheName).then(cache => {
18       console.log('caching shell assets');
19       cache.addAll(assets)
20     })
21   );
22
23   // activate event
24   self.addEventListener('activate', evt => {
25     //console.log('Service worker has been activated');
26   });
27
28   // fetch event
29   self.addEventListener('fetch', evt => {
30     //console.log('fetch event', evt);
31     evt.respondWith(
32       caches.match(evt.request).then(cacheRes => {
33         return cacheRes || fetch(evt.request);
34       })
35     );
36   });
37
38
39
```

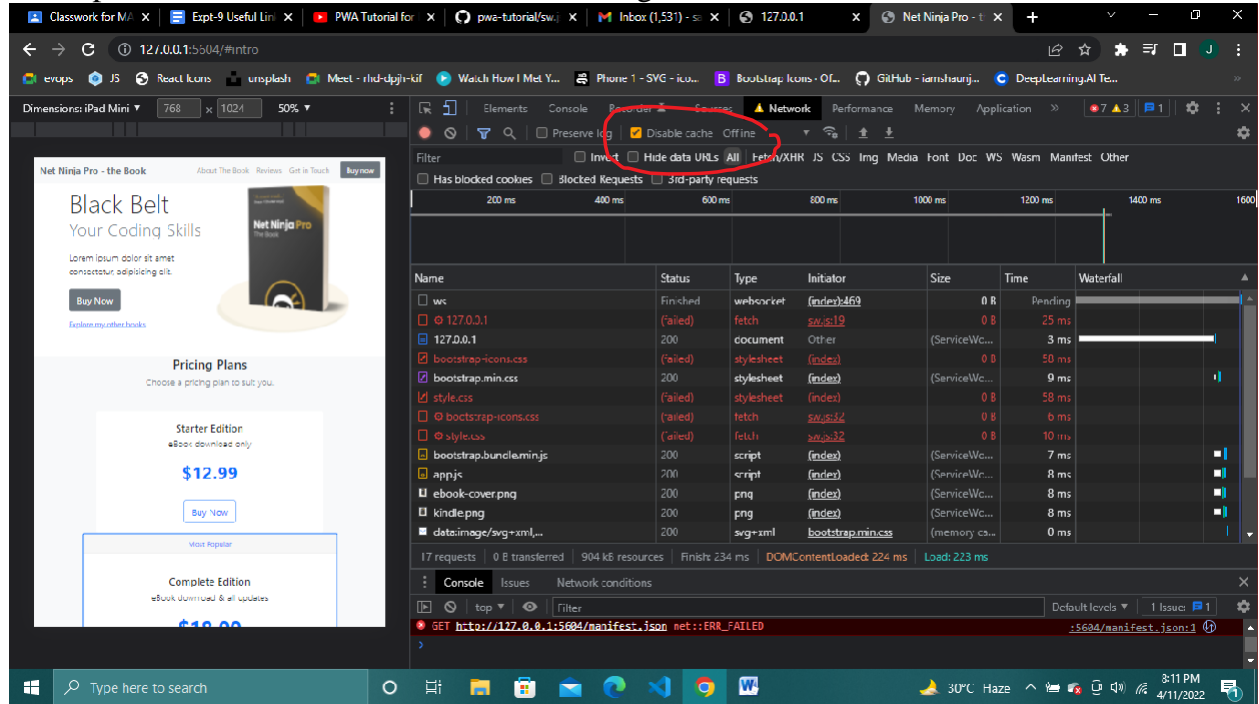
The browser window shows the URL `127.0.0.1:5604/#intro`. The page content includes a book cover for "Black Belt Your Coding Skills" and pricing information. The Network tab is open, showing a list of requests:

Name	Status	Type	Initiator	Size	Time	Waterfall
127.0.0.1	304	fetch	sw.js:19	297 B	20 ms	
127.0.0.1	200	document	Other		4 ms	
bootstrap.min.css	200	stylesheet	(index)	(ServiceWo...)	3 ms	
bootstrap-icons.css	200	stylesheet	(index)	(ServiceWo...)	9 ms	
style.css	200	stylesheet	(index)	(ServiceWo...)	14 ms	
style.css	304	fetch	sw.js:32	295 B	10 ms	
bootstrap.bundle.min.js	200	script	(index)	(ServiceWo...)	7 ms	
app.js	200	script	(index)	(ServiceWo...)	8 ms	
ebook-cover.png	200	png	(index)	(ServiceWo...)	8 ms	
kindle.png	200	png	(index)	(ServiceWo...)	8 ms	
data:image/svg+xml...	200	svg+xml	bootstrap.min.css	(memory ca...)	0 ms	
bootstrap-icons.woff2730af91bf14e37666a...	200	font	bootstrap-icons.css	(ServiceWo...)	5 ms	
bootstrap-icons.woff2730af91bf14e3766...	200	fetch	sw.js:32	(disk cache)	3 ms	

The console shows the following messages:

```
> code: 'http://127.0.0.1:5604/', ...
```

Some part of the website is available even though network is offline cause of cache.



8. Post-Experimental Exercise

A. Questions:

1. Explain how the caching mechanism gets implemented with service worker

B. Conclusion:

1. Write what you have learnt in the experiment.

C. References:

1. <https://flaviocopes.com/service-workers/>



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Exp a : MAP & PwP lab.

Q.8

A. Caching is a mechanism to improve the performance of any type of application. Technically, caching is the process of storing & accessing data from a cache. The service worker checks if the resource is in its cache & decide whether to return the resource itself based on its programmed caching strategies. A service worker intercepts network-type HTTP requests & uses a caching strategy to determine what resources should be returned to the browser.

B. Conclusion.

In this experiment we learnt how service workers operate. We made a web manifest file and added it to our e-commerce app.

