MAD and PWA Lab

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Experiment – 8

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 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.

Here's a theory on how to code and register a service worker and complete the installation and activation process for a new service worker:

Service Worker Registration:

Start by creating a JavaScript file for the service worker (e.g., service-worker.js).

In your main HTML file (e.g., index.html), include code to register the service worker. This code typically resides within a <script> tag and should be placed near the bottom of the <body> tag to ensure the DOM content is fully loaded before registering the service worker.

Use the navigator.serviceWorker.register() method to register the service worker script. This method takes the path to the service worker script as its parameter.

It's a best practice to perform feature detection to check if the browser supports service workers before attempting to register one.

Service Worker Installation:

Once the service worker is registered, the browser will attempt to install it.

Inside the service worker script, listen for the install event. This event is triggered when the browser detects a new service worker for the first time.

Upon installation, you can perform tasks such as caching static assets (HTML, CSS, JavaScript, images) using the Cache API. This ensures that the application shell is available offline.

During installation, pre-cache essential assets by fetching and storing them in the cache storage.

Service Worker Activation:

After the service worker is successfully installed, it enters the activation phase.

Listen for the activate event inside the service worker script. This event is triggered once the service worker becomes active.

During activation, you can clean up old caches from previous versions of the service worker to ensure the application uses the latest assets.

Remove outdated caches using the CacheStorage API, typically by comparing cache keys to the current version and deleting obsolete caches.

Testing and Debugging:

Test the service worker functionality thoroughly, both in online and offline scenarios, to ensure proper caching and offline behavior.

Use browser developer tools to debug service worker code, inspect cache storage, and monitor service worker lifecycle events.

Consider implementing logging and error handling within the service worker to facilitate debugging in production environments.

Code:
index.html:

```html
<!DOCTYPE html>

<html>

<head>
   <title>Simple web page Template</title>
   <link rel="stylesheet" href="style.css">
</head>

<body>
   <nav class="navbar background">
      <div class="logo">
         <img src=
"https://media.geeksforgeeks.org/gfg-gg-logo.svg"
            style="height: 30px;"
            alt="Logo">
      </div>
      <ul class="nav-list">
         <li><a href="#web">Web Technology</a></li>
```

```html
            <li><a href="#program">C Programming</a></li>
            <li><a href="#course">Courses</a></li>
        </ul>
        <div class="rightnav">
            <input type="text"
                   name="search"
                   id="search">
            <button class="btn btn-sm">Search</button>
        </div>
    </nav>

    <section class="firstsection">
        <div class="box-main">
            <div class="firstHalf">
                <h1 class="text-big"
                    id="web">Web Technology
                  </h1>
                <p class="text-small">
                    HTML stands for HyperText Markup Language.
                    It is used to design web pages using a markup
                    language. HTML is the combination of Hypertext
                    and Markup language. Hypertext defines the
                    link between the web pages. A markup language
                    is used to define the text document within tag
                    which defines the structure of web pages.
                    HTML is a markup language that is used by the
                    browser to manipulate text, images, and other
                    content to display it in the required format.
                </p>


            </div>
        </div>
    </section>

    <section class="secondsection">
        <div class="box-main">
            <div class="firstHalf">
                <h1 class="text-big"
                    id="program">
                    C Programming
                </h1>
                <p class="text-small">
                    C is a procedural programming language. It
                    was initially developed by Dennis Ritchie
                    as a system programming language to write
                    operating system. The main features of C
```

```html
          language include low-level access to memory,
          simple set of keywords, and clean style,
          these features make C language suitable for
          system programming like operating system or
          compiler development.
        </p>
      </div>
    </div>
  </section>

  <section class="section">
    <div class="paras">
      <h1 class="sectionTag text-big">Java</h1>
      <p class="sectionSubTag text-small">
        Java has been one of the most popular
        programming language for many years.
        Java is Object Oriented. However it is
        not considered as pure object oriented
        as it provides support for primitive
        data types (like int, char, etc) The
        Java codes are first compiled into byte
        code (machine independent code). Then
        the byte code is run on Java Virtual
        Machine (JVM) regardless of the
        underlying architecture.
      </p>
    </div>

    <div class="thumbnail">
      <img src="img.png"
        alt="laptop image">
    </div>
  </section>

  <footer class="background">
    <p class="text-footer">
      Copyright ©-All rights are reserved
    </p>
  </footer>
</body>

</html>
```

main.css:

main.css:

```css
* {

    margin: 0;
    padding: 0;
}

.navbar {
    display: flex;
    align-items: center;
    justify-content: center;
    position: sticky;
    top: 0;
    padding: 15px;
    cursor: pointer;
}

.background {
    background: black;
    background-blend-mode: darken;
    background-size: cover;
}

.nav-list {
    width: 70%;
    display: flex;
    align-items: center;
    gap: 20px;
    list-style: none;
}

.logo {
    display: flex;
    justify-content: center;
    align-items: center;
}

.logo img {
    width: 180px;
    border-radius: 50px;
}

.nav-list li {
    list-style: none;
    padding: 26px 30px;
    padding: 10px;
}
```

```css
.nav-list li a {
    text-decoration: none;
    color: white;
}

.nav-list li a:hover {
    color: grey;
}

.rightnav {
    width: 30%;
    text-align: right;
}

#search {
    padding: 5px;
    font-size: 17px;
    border: 2px solid grey;
    border-radius: 9px;
}

.firstsection {
    background-color: green;
    height: 400px;
}

.secondsection {
    background-color: blue;
    height: 400px;
}

.box-main {
    display: flex;
    justify-content: center;
    align-items: center;
    color: black;
    max-width: 80%;
    margin: auto;
    height: 80%;
}

.firsthalf {
    width: 100%;
    display: flex;
    flex-direction: column;
    justify-content: center;
}

.secondhalf {
    width: 30%;
}

.secondhalf img {
    width: 70%;
    border: 4px solid white;
    border-radius: 150px;
    display: block;
    margin: auto;
}

.text-big {
    font-family: 'Piazzolla', serif;
    font-weight: bold;
    font-size: 35px;
}

.text-small {
    font-size: 18px;
}

.btn {
    padding: 8px 20px;
    margin: 7px 0;
    border: 2px solid white;
    border-radius: 8px;
    background: none;
    color: white;
    cursor: pointer;
}

.btn-sm {
    padding: 6px 10px;
    vertical-align: middle;
}

.section {
    height: 400px;
    display: flex;
    align-items: center;
    justify-content: center;
    max-width: 90%;
    margin: auto;
}
```

```css
.section-Left {
    flex-direction: row-reverse;
}

.paras {
    padding: 0px 65px;
}

.thumbnail img {
    width: 250px;
    border: 2px solid black;
    border-radius: 26px;
    margin-top: 19px;
}

.center {
    text-align: center;
}

.text-footer {
    text-align: center;
    padding: 30px 0;
    font-family: 'Ubuntu', sans-serif;
    display: flex;
    justify-content: center;
    color: white;
}

footer {
    text-align: center;
    padding: 15px;
}


.rightnav {
    width: 100%;
    text-align: right;
    margin-top: 10px;
}

#search {
    box-sizing: border-box;
    width: 70%;
    padding: 8px;
    font-size: 17px;
    border: 2px solid grey;
    border-radius: 9px;
}

.btn-sm {
    padding: 8px 20px;
    margin: 7px 5px;
}

img {
    max-width: 100%;
    height: auto;
}
```

App.js:

```javascript
if ('serviceWorker' in navigator) {

    window.addEventListener('load', () => {
        navigator.serviceWorker.register('/service-worker.js')
            .then(registration => {
                console.log('Service Worker registered with scope:', registration.scope);
            })
            .catch(error => {
                console.error('Service Worker registration failed:', error);
            });
    });
}
```

Service-worker.js:

```javascript
// service-worker.js



const cacheName = 'gfg-pwa-v1';
const assetsToCache = [
    '/',
    '/index.html',
    '/main.css',
    '/app.js'
    // Add more files and assets here as needed
];


self.addEventListener('install', event => {
    event.waitUntil(
        caches.open(cacheName)
```

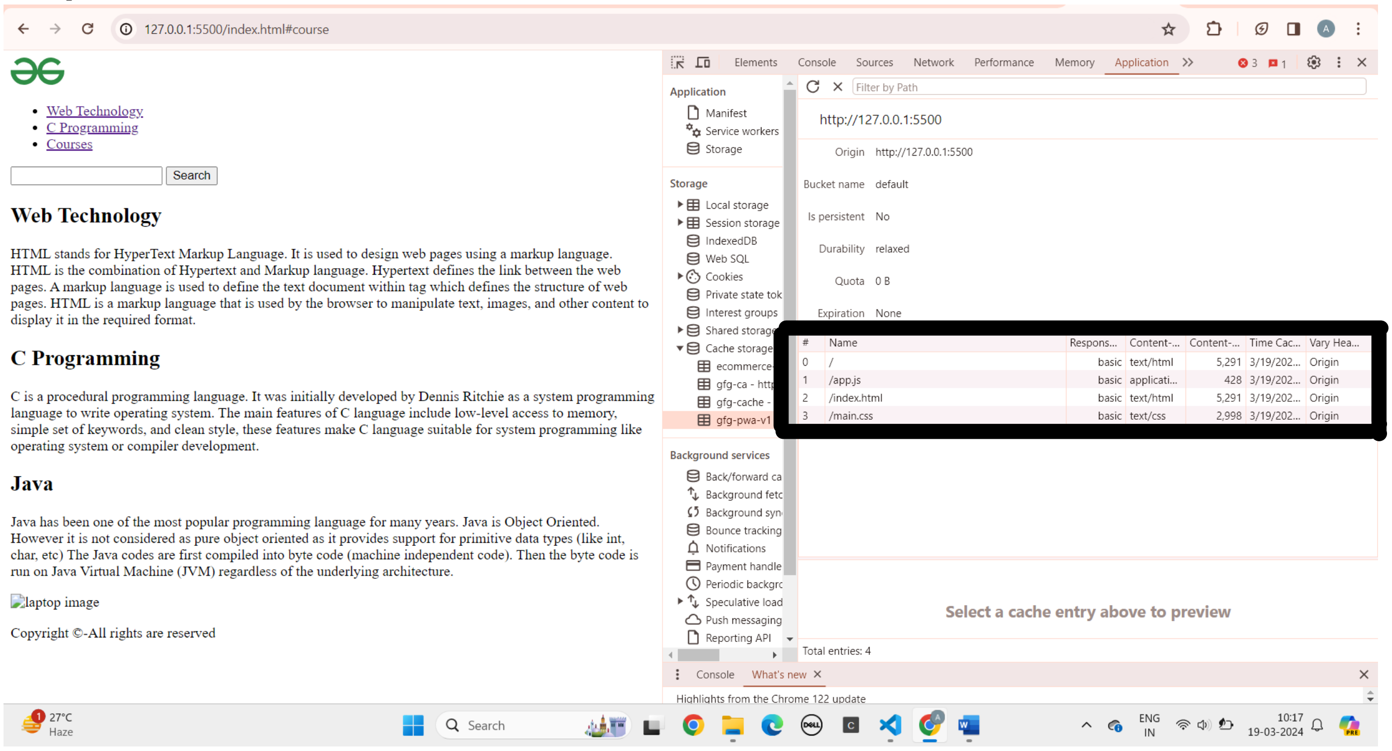
```
            .then(cache => {
                return cache.addAll(assetsToCache);
            })
    );
});


self.addEventListener('activate', event => {
    event.waitUntil(
        caches.keys().then(cacheNames => {
            return Promise.all(
                cacheNames.filter(name => {
                    return name !== cacheName;
                }).map(name => {
                    return caches.delete(name);
                })
            );
        })
    );
});
```

Steps for Execution:-

- Create a folder and put all 4 files main.css , service-worker.js, app.js, index.html
- Open visual studio
- Install extension Live server
- Open folder in visual studio open index.html
- On bottom right corner click go Live
- It will open html page in browser
- Go to developer tools

Output:



127.0.0.1:5500/index.html#course

- Web Technology
- C Programming
- Courses

Search

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C Programming

C is a procedural programming language. It was initially developed by Dennis Ritchie as a system programming language to write operating system. The main features of C language include low-level access to memory, simple set of keywords, and clean style, these features make C language suitable for system programming like operating system or compiler development.

Java

Java has been one of the most popular programming language for many years. Java is Object Oriented. However it is not considered as pure object oriented as it provides support for primitive data types (like int, char, etc) The Java codes are first compiled into byte code (machine independent code). Then the byte code is run on Java Virtual Machine (JVM) regardless of the underlying architecture.

laptop image

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http://127.0.0.1:5500

Origin http://127.0.0.1:5500

Bucket name default

Is persistent No

Durability relaxed

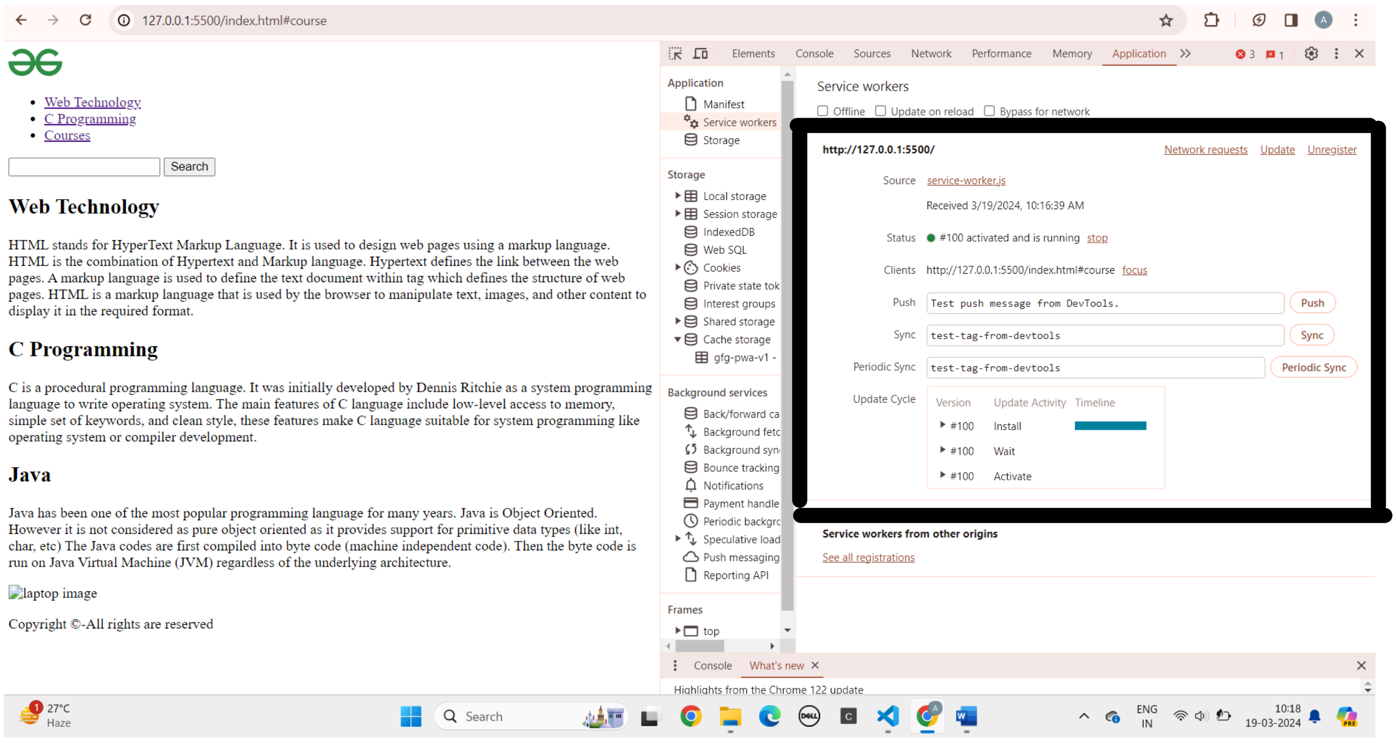
Quota 0 B

Expiration None

#	Name	Respons...	Content-...	Content-...	Time Cac...	Vary Hea...
0	/	basic	text/html	5,291	3/19/202...	Origin
1	/app.js	basic	applicati...	428	3/19/202...	Origin
2	/index.html	basic	text/html	5,291	3/19/202...	Origin
3	/main.css	basic	text/css	2,998	3/19/202...	Origin

Select a cache entry above to preview

Total entries: 4



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laptop image

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Service workers

☐ Offline ☐ Update on reload ☐ Bypass for network

http://127.0.0.1:5500/ Network requests Update Unregister

Source service-worker.js

Received 3/19/2024, 10:16:39 AM

Status ● #100 activated and is running stop

Clients http://127.0.0.1:5500/index.html#course focus

Push `Test push message from DevTools.` Push

Sync `test-tag-from-devtools` Sync

Periodic Sync `test-tag-from-devtools` Periodic Sync

Update Cycle

Version	Update Activity	Timeline
#100	Install	▬
#100	Wait	
#100	Activate	

Service workers from other origins

See all registrations

Conclusion:

In this experiment, we have registered a service worker, and completed the install and activation process for a new service worker for the PWA.