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Akshad Mhaskar
D15B/32

MPL Assignment - 2

Q1) Define Progressive web App (PWA) & explain its significance in modern web dev. Discuss the key characteristics that differentiate PWA's from traditional mobile apps.

→ A progressive web App (PWA) is type of web application that works like a mobile app but runs in a browser. It can be installed on a device works offline & provides a fast & smooth user experience.

Significance of PWA in modern web dev.

- Cross platform compatibility
- offline support
- Fast performance
- Lower development cost

→ Key diff bet^n PWA & traditional mobile Apps.

Features	PWA	traditional Mobile App
• Installation	Direct from browser	Download from App store
• Internet required	works offline with caching	usually requires internet
• Performance	Fast with service workers	Faster but needs installations
• update	Automatic no app store approval	manual updates needed.
• Dev cost	lower	Higher

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Q2) Define responsiveness web design & explain its importance in the context of PWA compare & constrast responsiveness fluid & adaptive web design approaches.

→ Responsive Web Design (RWD) is technique that make web pages adjust automatically to different screen sizes & devices. It ensures a good user experience on mobiles, tablets & desktops without needing separate version of website.

Importance of responsiveness design in PWA.

- Better user exp - PWA's work smoothly on any device.
- Faster load time - optimized design improves speed.
- SEO Benefits - Google ranks responsive sites higher.
- Cost effective - No need to design multiple versions for different screens.

Comparision of web design approaches

Approaches	How it works	Pros	Cons
• Responsives	uses flexible grids & CSS media queries to adjus layout	works on all devices	can be complex to design
• Fluid	uses percent based widths instead of fixed pixels so elements resize smoothly	works wellon different screen sizes easy to implement	less control over layout on large screens

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• Adaptive	Uses fixed layouts that change at specific breakpts	optimized by known screen sizes	most effort require to design by screen size.

Key differences
- Responsive adapts dynamically to all screens.
- Fluid resizes smoothly, but must be fully a proiritized.
- Adaptive loads different layouts based on device types.

Q3) Describe the lifecycle workers including to registration installation & activation phase.

→ Lifecycle of service workers

A service workers is a script that runs in the background & a helps a web app work offline load faster & send push notification, its lifecycle has 3 main phases.

1. Registration Phase

The browser registers the source worker using JS.

Ex:-

```
If ('service worker' in navigator){
navigator service worker register (`/sw.js`)
.then (()→ console.log (`Service work 'registered')))
.catch (error → conde.log (Registration failed', error));
```

This tells the browser to install & activate the service worker ~~installation phase~~

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2. Installation Phase
The service worker downloads necessary files (HTML, CSS, JS) & stores them in cache.
If successful it moves to the activation phase.
Ex:-

```
self.addEventListener('install', event => {
    event.waitUntil(
      caches.open(app.cache).then(cache => {
return cache.addAll(['/', 'index.html',
    'styles.css']);
    })
    }); });
```

This ensures the app loads even without the internet

3. Activation Phase
- The old service worker is replaced with the new one
- Unused cache files from the previous version are deleted
- How step step & sync.

Once activated the service worker intercepts network requests, serves cached files & syncs data when the internet is available. This lifecycle makes PWA's faster, more ~~real~~ relatable & capable of working offline.

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Q4) Explain the use of Indexed DB in the system service worker of data storage.

→ Use of IndexedDB in service worker for data storage IndexedDB is a browser database that stores large amounts of structured data like JSON or objects. It helps PWA's work offline by saving & retrieving data efficiently.

Why use IndexedDB in service workers?

1. Office support - Stores data when offline & syncs it later.
2. Efficient storage - Saves structured data like user setting cost items or form inputs.
3. Faster Access - Retrieves data quickly without needing a network request.
4. Persisent Data - Data remains saved even after the browser is classed

How service workers use Indexed DB?

opening the database

```
let db;
let request = indexedDB.open('My database');
  request.onsuccess = function (even) {
      db = event.target.result;
    };
```

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Creating a store & adding Data

```
request.onupgradeneeded = function(event){
let db = event.target.result;
let store = db.createObjectStore('users', & keypath
    : 'id'});
store.add({id:1, name:'John Doe', age:'age 25'});
};
```

Fetching Data in service worker

```
let transaction = db.transaction('users','read only');
let store = transaction.objectstore('users');
let getuser = store.get(1);

getusers.onsuccess = function(){
  console.log('get user detail');
};
```