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MPL Assignment 2

Define progressive web app (PWA) and explain its significance in modern web development. Discuss the key characteristis that differentiate PWA's from traditional mobile apps.

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

Significance of PWA in Modern web & development:
(1) cross platform compatibility
(2) offline support.
(3) Fast Performance
(4) No App store required
(5) Lower Development cost.

Key differences between 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 installation.

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Updates	Automatic no app store approval	Manual Updat needed.
Development cost	Lower (one codebase for all)	Higher (separa apps for ea platform).

PWA's combine the best of e web and mobile apps making them efficient and user friendly

2) Define responsive web design and explain its importance in the context of progressive w apps. Compare and contrast responsive, fluid a adaptive web design approaches.

-) Definition of Responsive web design:

Responsive web design (RWD) is technique that makes web pages adjust automatically to differen screen sizes and devices. It ensures a good user experience on mobile, tablets and desktops without needing separate versions of website.

Importance of Responsive Design in PWA's:-

1. Better User Experience
2. Faster load time
3. ~~SEO~~ SEO Benefits
4. Cost Effective.

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Comparison of web design approaches.

Approach	How it works	Pros	Cons
Responsive	Uses flexible grids and css media queries to adjust layout	Works on all devices	Can be complex to design.
Fluid	Uses percent based widths instead of fixces pixels, so elements resize smoothly	Works will on different screen sizes, easy to implement	less control over layout on large screenc.
Adaptive	Uses fixed layout that change at specific breakpoints.	Optimized for known screen sizes	More effort required to design for each screen size.

Key differences.

- Responsive adapts dynamically to all screens.
- Fluid & resizes smoothly but may not be fully optimized
- Adaptive loads different layouts based on device types.

Q3 Dessibe the lifecycle of service workers, including registration, installation and activation phases.

-> Lifecycle of service worker:

A service worker is a scripts That ~~th~~ runs in background and helps a web app work offlin load faster and send push notifications. Its lifecycle has three main phases.

(1) Registration Phase

- The browser registers the service worker using Javassript

Code eg.

```
if ('service worker' in navigator) {
    navigator.serviceWorker.register('/sw.js')
    .then(()=> console.log('service worker Registe
    .catch(error => console.log('Registration failed!')
    error));
```

This tells the browser to install and activate the service worker.

(2) Installation phase

- The service worker downloads, necessary files (HTML, CSS, JSS) and stores them in cache
- If successful it moves to the activation phase.

code example:

```
self add EventListener ('install', event => {
    event wait until (
```

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```
    caches open(app- cache ). then (cache =>{
    return cache-add All ('[ '/', ('index.html',
    styles. css' ]') ;
  })
 });
})
```

- This ensures the app loads.

(3) Activation Phase

- The old service worker is replaced with the new one.
- Unused cache files from the previous versions are deleted.

Final step: Feth & Sync

once activated, the service worker intercepts network requests, serves cached files and syncs data when the internet is available.

Q4 Explain the uses of Indexed DB in service worker for data storage

-> Use of Indexed DB in service worker for Data storage Indexed DB is a browser database that stores large amounts of structured data like JSON objects. It helps PWA's work offline by saving and retrieving data of efficiently.

Why use Indexed DB in service worker?

① Offline Support: stores data when offline and syncs later.

② Efficient Storage: saves structured data like user setting cart items or form inputs.

③ Faster Access: Retrieves data quickly without need a network request.

④ Persistent Data- Data remains saved even a the browser is closed.

How service works use Indexed DB?

opening the database

```
let db;
let request = indexDB.open('My Database');
 request.onsuccess = function(event){
       db = event.target.result;
  };
```

Creating a store and ~~add~~ adding data

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

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Fetching Data in service worker

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

getuser.onsuccess = function(){
    console.log(getuser.result);
};
```