

## PWA Assignment

### Assignment - 2

Q.1 Define Progressive Web App (PWA) & explain its significance in modern web development. Discuss key characteristics that differentiate PWAs from traditional mobile App.

→ A progressive web app is a type of web application that utilizes modern web applications to deliver an app like experience to users. PWA's are designed to be responsive, fast, & engaging & provide a seamless user experience across devices.

Significance in Modern Web Development.

1. Cross Platform Compatibility: PWA's can run on any device with a web browser, regardless of the operating system.
2. Offline functionality: One of the key features of PWA's is their ability to work offline or with limited connectivity.
3. Free Installation: Unlike traditional apps PWA don't require installation from an app store. Users can simply access the PWA through web browser & add it to home screen.

## Key Characteristics differentiating PWAs From traditional Mobile Apps.

1. **Development Approach:** PWAs are typically built using web technologies like HTML, CSS & JS while traditional apps are built using platform specific languages (eg ~~B~~ Swift, Kotlin)
2. **Distribution:** PWAs distributed via the web & can be easily shared via URL, whereas traditional apps are distributed through app stores & require approval from the respective platform's store.
3. **Installation:** PWA's are accessed through web browser & can be added to the home screen while traditional apps are downloaded & installed from app stores.

Overall, PWAs offer a compelling alternative to traditional mobile apps, providing a modern, cost-effective & accessible solution for delivering app like experience on the web.



Q. Describe the lifecycle of service workers, including registrations, installation & activation phases.

→ The lifecycle of service workers involves several phases below is a detailed explanation of each phase.

### 1. Registration

- The first step using a service worker is register it within the web application.
- Typically done by including a registration script in the main JS file of the application.
- The process is initiated using 'navigator.serviceWorker.register()' method.

### 2. Installation

- Once service worker is registered, the browser begins the installation process.

### 3. Activation

- After service worker is successfully installed, it goes through the activation phase.
- During activation, the new version of the service worker becomes active & takes control of certain events & n/w requests within the scope of registration.

Q. Define responsive web design & explain its importance in the context of progressive web Apps. Compare & Contrast responsive, fluid & adaptive web design approach.

→ Responsive web design is an approach to web design that aims to create web pages that automatically adjust & adapt their layout & content to fit various screen sizes & devices.

Importance in the Context of Progressive Web Apps:

1. **Accessibility:** Responsive design makes PWAs accessible to wider audience, as users can access the app from any device without encountering layout issue.
2. **Consistency:** By maintaining consistent design & layout across devices, responsive web design helps reinforce the branding & user experience.
3. **Cross Devices Compatibility:** Since PWA's aim to provide a seamless user experience across different devices responsive web design plays a crucial role in ensuring that the PWA looks & functions well.



Responsive Web Design	Fluid Web Design	Adaptive Web Design
Users Flexible grids & layouts that adjust based on screen size	Utilizes fluid grids & layouts that smoothly expand or contract.	Creates a multiple versions of site optimized for specific devices
Relies on CSS media queries to adapt styling	May use Media queries but emphasizes fluidity of elements.	Uses Server side detection to serve different layouts
One codebase that adapts to various devices	Emphasizes percentage based layouts & fluid images.	Requires separate versions of the site for diff. device
Offers consistent user experience across devices.	Provides continuous user experience	Tailors the user experience.
Easier Maintenance with single codebase.	Requires adjustment to ensure fluidity	Allows for precise control over user experience.

DATE:

Q.4. Explain the use of Indexed DB in the Service worker for data storage.

→ Indexed DB is low-level API for client-side storage of significant amounts of structured data, including files & blobs. It is useful for web applications that need to store large amount of data locally such as PWA's.

Here's how Indexed DB can be used in a Service worker for data storage:

1. Caching Assets: One of the primary use cases of Indexed DB in a service worker is caching assets such as HTML, CSS, JS files, images & other resources. This allows application to function offline.

2. Dynamic Data Storage: Indexed DB can also be used to store dynamic data generated by web application.

3. Performance Optimization: By storing frequently accessed data in Indexed DB service workers can improve performance in applications.