

11

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65

Assignment - 2

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

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

(* Significance in Modern Web Development :

(1) Cross platform compatibility :- PWAs can run on any device with a web browser, regardless of OS.

(2) Offline functionality - One of the key features of PWAs is their ability to work offline or with limited connectivity.

(3) Free Installation :- Unlike traditional apps PWAs don't require installation from an app store. Users can simply access the PWA through web browser & add it to HomeScreen.

(*) Key characteristics differentiating PWAs from Traditional Mobile Apps.

(1) Development Approach:- PWAs are typically built using web technologies like HTML, CSS and JS while traditional apps are built using platform specific languages (eg: Swift, Kotlin).

(2) Distribution: PWAs are distributed via web & can be easily shared via URL, whereas traditional apps are distributed through app store and require approval from the respective platforms store.

(3) Installation:- PWAs are accessed through web Browsers and can be added to the home screen while traditional apps are downloaded and installed from app stores.

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

(Q2)

Define Responsive web design and explain its importance in the context of PWA. Compare and contrast responsive, fluid & adaptive web design.

→

Responsive web design is an approach to web design that aims to create webpages that automatically adjust and adopt their layout and content to fit various screen sizes and devices, ensuring a consistent user experience across desktops, tablets and smartphones.

Importance of PWA:-

(1) Accessibility:- Responsive design makes PWA's accessible to a wider audience, as many users can access the app across many devices, without encountering layout issues.

(2) Consistency:- By maintaining consistent design & layout across devices, responsive web design helps reinforce the branding & user experience.

(3) Cross Device Compatibility:- Since PWA's aim to provide a seamless user's experience across different devices, responsive web design plays a crucial role for making PWA functional across devices.

Responsive web design.

User flexible grids & layouts that adjust based on screen size.

Relies on CSS media queries to adapt styling based on screen size.

One codebase that adapts to various devices.

Easier maintenance with single codebase.

Fluid web design

Utilizes fluid grids & layout that smoothly expand or contract.

May use media queries but emphasizes fluidity of elements.

Emphasizes percentage based layouts & fluids images.

Requires adjustment to ensure fluidity across devices.

Adaptive web design.

Creates multiple versions of the site optimized for specific devices.

User server side detection to serve different layouts and versions.

Tailors the user experience for specific devices.

Allows for precise control over user experience.

(Q.3)

Describe the lifecycle of Service workers, including registration, 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 registered it within the web application.
- Typically, done by including script in main.js file of the application.
- The process is initiated using navigate Service workers register '() method'.

2. Installation:-

- Once Service worker is registered, the browser begins the installation process.
- During installation the browser downloads the Service worker file specified during registration.
- On successful installation the Service worker moves on the activation page.

3) Activation:-

- After activation 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 and new requests within the scope of registration.

(Q4) Explain use of indexedDB in service workers for data storage.

→ IndexedDB is a lower-level API for client-side storage of significant amounts of structured data, including files and blobs. It is useful for web apps that need to store large amount of data locally.

Here's how IndexedDB can be used in a service worker for data storage:

(1) Caching assets: One of the primary use cases of indexedDB in a service worker is caching assets such as HTML, CSS, JS files, images & other resources.

(2) Dynamic Data Storage: IndexedDB can also be used to store dynamic generated data by web apps.

(3) Background Synchronization: Service workers can be periodically sync data with a server in the background even when the application is not been used.

(4) Performance Optimizations: By storing frequently accessed data in indexedDB service worker can improve performance in application.