Experiment 7

Aim: To write meta data of your PWA in a Web app manifest file to enable "add to homescreen feature"

Theory:

Progressive Web Apps (PWAs) are web applications that leverage modern web technologies to provide a native app-like experience. A key feature of PWAs is the ability to be installed on a user's device home screen, improving accessibility and engagement.

Key Features of PWAs
1. Installable (Add to Home Screen)
   - Can be installed on a device's home screen without an app store.
   - Triggered via Web App Manifest (manifest.json).
   - Works on desktop (Chrome, Edge) and mobile (Android, iOS).
2. Offline Functionality (Service Workers)
   - Uses Service Workers to cache resources (HTML, CSS, JS, images).
   - Works even with no internet connection (e.g., flight mode).
   - Enables background sync for delayed data updates.
3. Fast and Reliable Performance
   - Pre-caching ensures instant loading on repeat visits.
   - Optimized for slow networks (2G/3G).
   - Uses PRPL pattern (Push, Render, Pre-cache, Lazy-load) for efficiency.
4. App-Like Experience (Web App Manifest)
   - Runs in standalone/fullscreen mode (no browser UI).
   - Supports splash screens (via background_color in manifest).
   - Push notifications (engages users like native apps).
5. Cross-Platform Compatibility
   - Works on any device (desktop, mobile, tablet).
   - No need for separate iOS (Swift) or Android (Kotlin) versions.
   - Single codebase reduces development costs.
6. Secure (HTTPS Required)
   - Must be served over HTTPS for security.
   - Prevents man-in-the-middle attacks.
   - Ensures data integrity and user trust.

Role of the Web App Manifest

The Web App Manifest (manifest.json) is a JSON file that provides metadata about the PWA, enabling browsers to:
- Trigger the "Add to Homescreen" (A2HS) prompt.
- Define how the app appears when launched (e.g., fullscreen, standalone).
- Specify icons, theme colors, and splash screen behavior.

Key Manifest Properties for "Add to Homescreen"

For a PWA to be installable, the manifest must include:

Property	Purpose	Example Value
`"name"`	Full app name	`"My PWA App"`
`"short_name"`	Short name for home screen	`"PWA"`
`"start_url"`	Entry point when launched	`"/index.html"`
`"display"`	UI mode (`standalone`, `fullscreen`, `minimal-ui`)	`"standalone"`
`"icons"`	Array of app icons (PNG/SVG, multiple sizes)	`[{ "src": "icon-192x192.png", "sizes": "192x192", "type": "image/png" }]`
`"background_color"`	Splash screen background	`"#ffffff"`
`"theme_color"`	App toolbar color	`"#4285f4"`
`"scope"`	Navigation scope (default: `start_url` dir)	`"/app/"`

Browser Installation Criteria
- For the "Add to Homescreen" prompt to appear, the PWA must meet these conditions:
- HTTPS Required – The app must be served over a secure connection.
- Valid Web App Manifest – Properly linked in the HTML (<link rel="manifest" href="/manifest.json">).
- Service Worker Registered – Ensures offline functionality (required for Chrome).

- Engagement Heuristics – The user must interact with the site multiple times (e.g., visit twice within 5 minutes).

How the Installation Process Works
- The browser checks for a valid manifest.json.
- If criteria are met, Chrome/Edge shows an install prompt (desktop/mobile).
- Safari (iOS) uses "Add to Home Screen" via the share menu.
- Once installed, the PWA launches in standalone mode (no browser UI).

Code:

```json
{
    "name": "Currency Converter PWA",
    "short_name": "CurrencyConv",
    "start_url": "index.html",
    "scope": "./",
    "icons": [
        {
            "src": "icons/icon-192x192.jpg",
            "sizes": "192x192",
            "type": "image/png",
            "purpose": "any maskable"
        },
        {
            "src": "icons/icon-512x512.jpg",
            "sizes": "512x512",
            "type": "image/png",
            "purpose": "any maskable"
        }
    ],
    "theme_color": "#008DDA",
    "background_color": "#008DDA",
    "display": "standalone",
    "description": "A progressive web app for currency conversion",
    "orientation": "portrait"
}
```
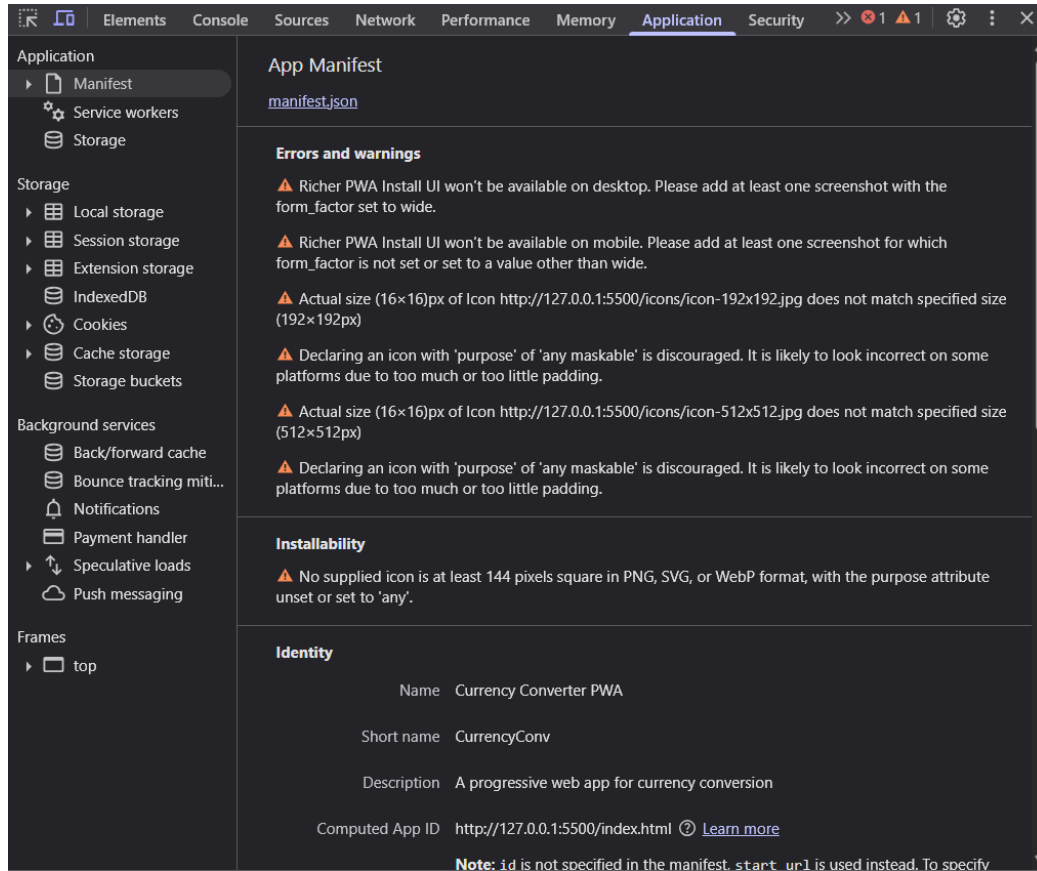
Add this in index.html inside the head tag:
```html
<link rel="manifest" href="manifest.json">
```

Run the website on the live server.
Inspect the webpage, go to application
Inside applications, verify if manifest.json has been loaded successfully or not.

Github link: https://github.com/Rakshit5467/Currency-Converter.git

Conclusion:
This experiment demonstrated how to enable the "Add to Homescreen" feature in a Progressive Web App (PWA) by configuring the Web App Manifest (manifest.json) with essential metadata such as name, icons, display, and theme_color. By linking the manifest in the HTML and verifying its proper loading via browser developer tools, we ensured that the PWA meets installation criteria, allowing users to install the app directly on their devices for an enhanced, app-like experience. This approach improves accessibility, engagement, and offline usability while eliminating the need for app store distribution.