Phase 4: Build, Deploy & APK Generation

Goal: Take your working local code and turn it into a live Website and an Android App.
Prerequisite: Ensure your app works locally (`npm run dev`) and looks correct.

Step 1: The "Freeze" (Build Command)

Before you can deploy, you must convert your human-readable code into a compact, high-performance version for machines.

1. **Stop the Local Server:**
   - In your terminal, click inside the window and press **Ctrl + C**.
2. **Run the Build Command:**

```
npm run build
```

3. **Verify:**
   - You should now see a new folder named `dist` in your project directory.
   - This folder contains your entire app (HTML, CSS, JS). This is what we will ship.

Step 2: Web Deployment (Vercel)

This gives you a public URL (e.g., `https://aqua-track-demo.vercel.app`) to share with anyone.

Method A: The "Drag & Drop" Way (Easiest)

1. Go to vercel.com and sign up (free).
2. On your dashboard, click **"Add New..."** -> **"Project"**.
3. Look for a manual upload option or install the Vercel CLI.
   - *Alternative:* Install the Vercel tool on your computer:

```
npm install -g vercel
```

4. **Deploy via Terminal (Fastest):**
   - Inside your `aqua-track` folder, run:

```
vercel
```

   - **Answer the questions:**

- Set up and deploy? **Y**
- Which scope? (Press Enter)
- Link to existing project? **N**
- Project name? **aqua-track**
- Directory? **dist** (Important! Vercel might auto-detect `dist`, if not, type `dist`)
- *Note:* If it asks for build settings, just press Enter to accept defaults.

5. **Result:** It will give you a **Production** URL. Click it to see your live app!

Step 3: Android APK (Capacitor)

This wraps your web code into a native Android container.

1. Initialize Capacitor (If not done yet):

```
npm install @capacitor/core @capacitor/cli @capacitor/android
npx cap init
```

- *App Name:* Aqua Track
- *Package ID:* com.aquatrack.app (or similar)

2. Sync the Build: Every time you run `npm run build`, you must tell Capacitor to copy the new `dist` folder to Android.

```
npx cap add android
npx cap sync
```

3. Open Android Studio:

```
npx cap open android
```

- This will launch the heavy Android Studio software.

Troubleshooting: "Build" menu is disabled (greyed out)? If you cannot click "Build APK", it means Android Studio is still setting up.

1. **Look at the bottom-right corner:** You will see progress bars saying "Gradle Build Running" or "Indexing".
2. **Wait:** You **must** wait for these bars to disappear completely (this can take 5-10 minutes for the first time).
3. **Force Sync:** If it stays stuck, go to **File** -> **Sync Project with Gradle Files**. Once the sync finishes, the "Build" menu will enable.

4. Build the APK:

1. In Android Studio, go to the top menu: **Build** -> **Build Bundle(s) / APK(s)** -> **Build APK(s)**.
2. Wait for the process to finish (check bottom right corner).
3. Click the blue **"locate"** link in the popup.
4. You will find `app-debug.apk`.
5. **Install:** Transfer this file to your phone and install it!

Summary of the Workflow

Now that you are set up, here is your cycle for future updates:

1. **Make Changes:** Edit code in VS Code.
2. **Build:** `npm run build`
3. **Update Web:** Run `vercel --prod`
4. **Update App:** Run `npx cap sync`, then open Android Studio to build a new APK.

Troubleshooting Common Issues

- **"Unchecked or unsafe operations" / "Recompile with -Xlint":** These are **warnings**, not errors. They appear in almost every Android build. If the build process finishes and you don't see big red "FAILED" text, **ignore them**. Proceed to locate your APK.
- **"Incompatible AGP Version" Error:** * This means Android Studio is older than the project configuration.
  - **Fix:** Open `android/build.gradle` in VS Code. Find `classpath 'com.android.tools.build:gradle:8.13.0'` (or similar high version). Change the number to `8.12.1`. Save and Sync.
- **Text Only / No Visuals:** You likely missed Step 4 (Tailwind Configuration).
- **Graph Error:** If the app is blank, ensure you ran `npm install recharts`.
- **White Screen on Android:** Make sure you ran `npm run build` *before* `npx cap sync`. Capacitor creates the app from the *build* folder, not your live code.
- **Firebase Error:** If data isn't showing, double-check your API Keys in `App.tsx`.