

CSI3007 - ADVANCED PYTHON PROGRAMMING

LAB ACTIVITY

Flutter Mobile App Deployment

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Aim: Using the Flutter webview_flutter package and local asset loading, a web-based game that was previously served by a Flask backend is transformed into a stand-alone, native Android application.

The goal is to ensure that the game functions offline by bundling all game files inside the APK instead of depending on an external, live web server (like Render).

Project Overview

Project – Tic Tac Toe Game

Project Folder:

The screenshot shows a Windows File Explorer window with the path 'This PC > OS (C:) > TicTacToeGame > tic_tac_toe_app'. The folder contains various subfolders and files, including '.dart_tool', '.idea', 'android', 'assets', 'build', 'ios', 'lib', 'linux', 'macos', 'test', 'web', 'windows', '.flutter-plugins-dependencies', '.gitignore', '.metadata', 'analysis_options', and 'pubspec.lock'. The table below provides a detailed view of these items.

Name	Date modified	Type	Size
.dart_tool	11-11-2025 12:08	File folder	
.idea	11-11-2025 11:54	File folder	
android	11-11-2025 12:20	File folder	
assets	11-11-2025 12:02	File folder	
build	11-11-2025 12:25	File folder	
ios	11-11-2025 11:54	File folder	
lib	11-11-2025 11:54	File folder	
linux	11-11-2025 11:54	File folder	
macos	11-11-2025 11:54	File folder	
test	11-11-2025 11:54	File folder	
web	11-11-2025 11:54	File folder	
windows	11-11-2025 11:54	File folder	
.flutter-plugins-dependencies	11-11-2025 12:15	FLUTTER-PLUGINS-D...	2 KB
.gitignore	11-11-2025 11:54	Git Ignore Source File	1 KB
.metadata	11-11-2025 11:54	METADATA File	2 KB
analysis_options	11-11-2025 11:54	Yaml Source File	2 KB
pubspec.lock	11-11-2025 12:15	LOCK File	8 KB

Link for Project:

<https://drive.google.com/drive/folders/1mrwyeF7Byz5Sdz9bDXIiesxOQo0St7aU?usp=sharing>

Flutter Project Configuration

- Install flutter: <https://docs.flutter.dev/install/manual>
- Create Flutter Project

```
PS C:\TicTacToeGame> flutter create tic_tac_toe_app
Creating project tic_tac_toe_app...
Resolving dependencies in `tic_tac_toe_app`... (5.2s)
Downloading packages...
Got dependencies in `tic_tac_toe_app`.
Wrote 130 files.

All done!
You can find general documentation for Flutter at: https://docs.flutter.dev/
Detailed API documentation is available at: https://api.flutter.dev/
If you prefer video documentation, consider: https://www.youtube.com/c/flutterdev

In order to run your application, type:

$ cd tic_tac_toe_app
$ flutter run

Your application code is in tic_tac_toe_app\lib\main.dart.

PS C:\TicTacToeGame> █
```

- Web App: Flask (app.py) served the game.
- Mobile App (main.dart):
Used `WebViewController().loadRequest(Uri.parse('https://dots-and-boxes-app-latest.onrender.com/'))`.

tic_tac_toe_app/lib/main.dart

```
import 'package:flutter/material.dart';

import 'package:webview_flutter/webview_flutter.dart';

void main() {

  WidgetsFlutterBinding.ensureInitialized();
  runApp(const TicTacToeApp());
}
```

```
class TicTacToeApp extends StatefulWidget {
  const TicTacToeApp({super.key});

  @override
  State<TicTacToeApp> createState() => _TicTacToeAppState();
}
```

```
}

class _TicTacToeAppState extends State<TicTacToeApp> {
    late final WebViewController _controller;

    @override
    void initState() {
        super.initState();

        // Create a controller for the WebView
        _controller = WebViewController()
            ..setJavaScriptMode(JavaScriptMode.unrestricted);

        _controller.loadFlutterAsset('assets/index.html');
    }

    @override
    Widget build(BuildContext context) {
        return MaterialApp(
            debugShowCheckedModeBanner: false,
            title: 'Tic Tac Toe',
            home: Scaffold(
                appBar: AppBar(title: const Text('Tic Tac Toe')),
                body: SafeArea(
                    child: WebViewWidget(controller: _controller),
                ),
            ),
        );
    }
}
```

- Add Dependencies and Assets in **pubspec.yaml**

dependencies:

flutter:

 sdk: flutter

 # 1. ADD THE WEBVIEW PACKAGE

 webview_flutter: ^4.7.0 # Use the latest stable version

flutter:

 uses-material-design: true

 # 2. DECLARE THE ASSETS FOLDER

assets:

 - assets/

- Run Pub Get

```
PS C:\TicTacToeGame\tic_tac_toe_app> flutter pub get
Resolving dependencies...
Downloading packages...
  characters 1.4.0 (1.4.1 available)
  flutter_lints 5.0.0 (6.0.0 available)
  lints 5.1.1 (6.0.0 available)
  material_color_utilities 0.11.1 (0.13.0 available)
  meta 1.16.0 (1.17.0 available)
  test_api 0.7.6 (0.7.8 available)
Got dependencies!
6 packages have newer versions incompatible with dependency constraints.
Try `flutter pub outdated` for more information.
PS C:\TicTacToeGame\tic_tac_toe_app> █
```

- Final APK Build

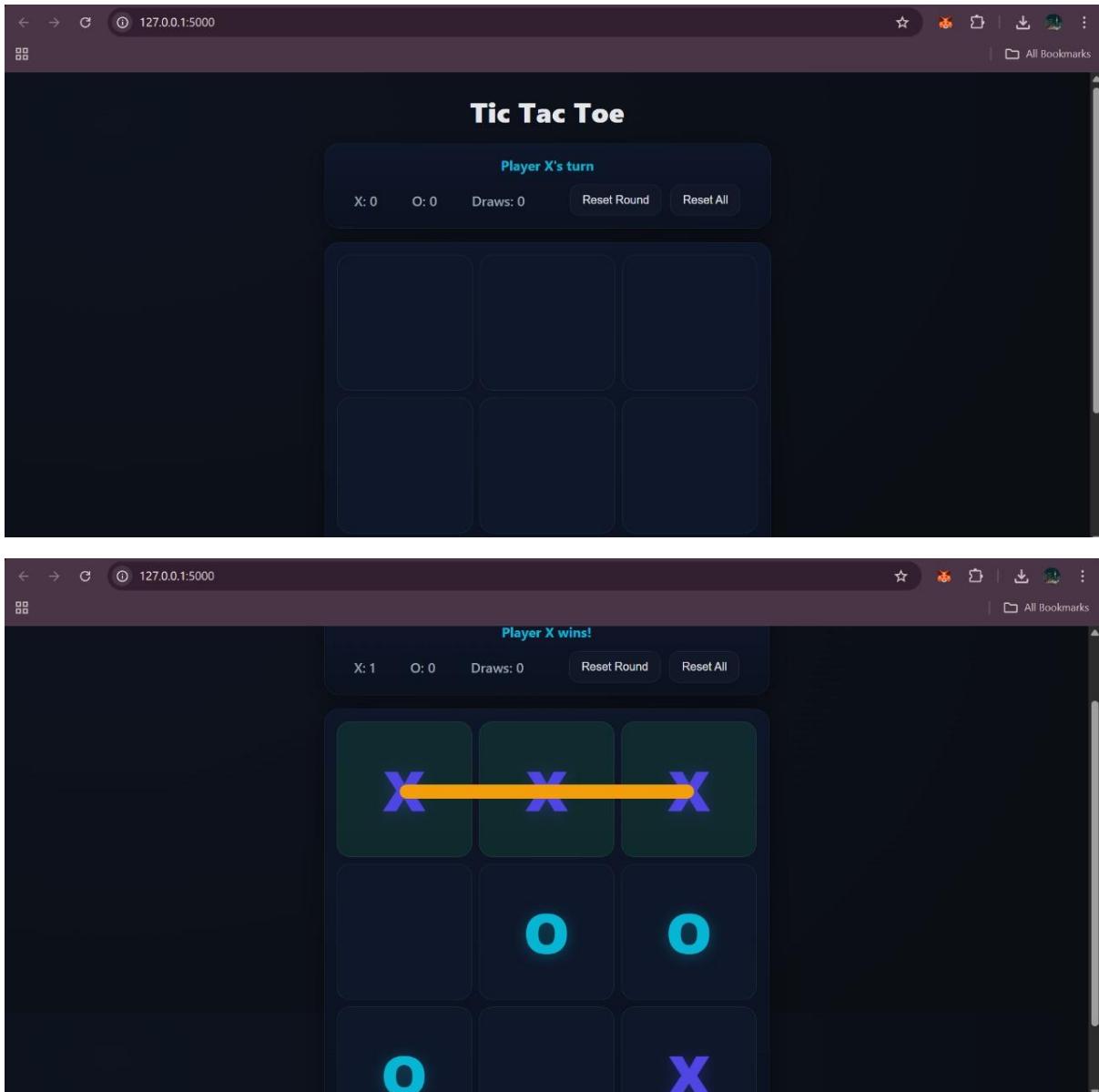
```
PS C:\TicTacToeGame\tic_tac_toe_app> flutter pub get
Resolving dependencies...
Downloading packages...
  characters 1.4.0 (1.4.1 available)
  flutter_lints 5.0.0 (6.0.0 available)
  lints 5.1.1 (6.0.0 available)
  material_color_utilities 0.11.1 (0.13.0 available)
  meta 1.16.0 (1.17.0 available)
  test_api 0.7.6 (0.7.8 available)
Got dependencies!
6 packages have newer versions incompatible with dependency constraints.
Try `flutter pub outdated` for more information.
PS C:\TicTacToeGame\tic_tac_toe_app> flutter build apk --release
Font asset "MaterialIcons-Regular.otf" was tree-shaken, reducing it from 1645184 to 1312 bytes (99.9% reduction). Tree-shaking can be disabled by providing the --no-tree-shake-icons flag when building your app.
Running Gradle task 'assembleRelease'...                                501.3s
✓ Built build\app\outputs\flutter-apk\app-release.apk (39.8MB)
PS C:\TicTacToeGame\tic_tac_toe_app> █
```

- Locating the Final APK: Upon successful completion, game's self-contained APK file will be located here:

tic_tac_toe_app\build\app\outputs\flutter-apk\app-release.apk

Final Outcome

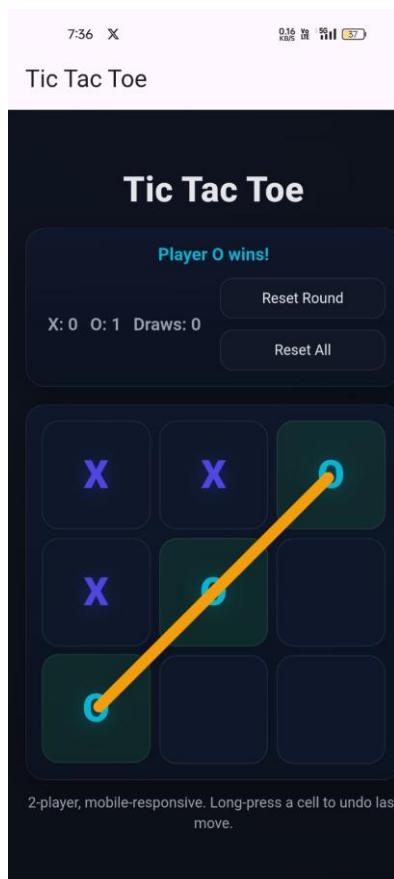
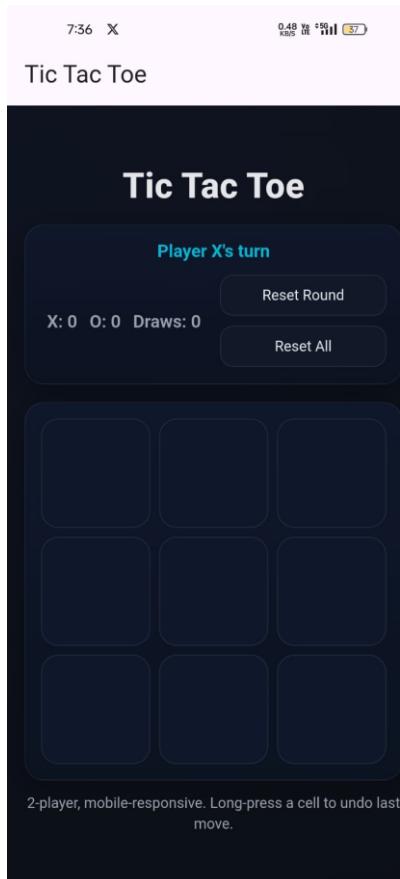
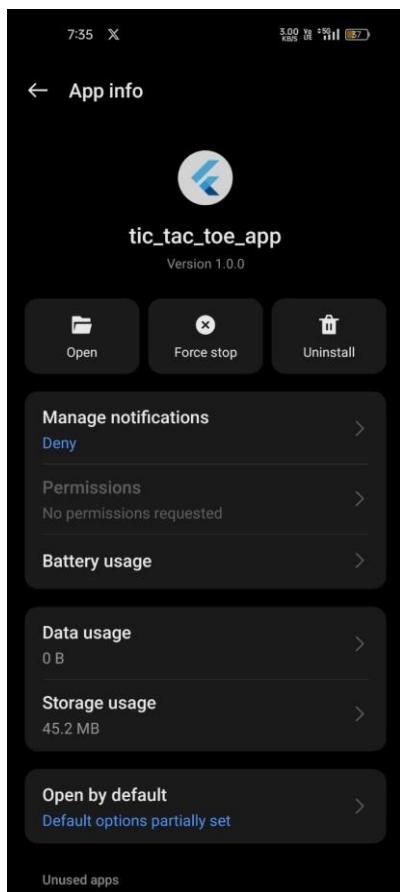
Tic-Tac-Toe Game snapshots: (Local Host)



APK file:

<https://drive.google.com/file/d/1aC6sMhl5XZlwYRKxDounckjZgx0RmMgs/view?usp=sharing>

Snapshots of Mobile App:



Outcome:

Using the Flutter Assets system and the `WebViewController.loadFlutterAsset()` method, we have successfully bundled the compiled codes into a single, coherent mobile application package, transforming the Tic-Tac-Toe game from a remote web application that required your Render server and a continuous internet connection into a fully self-contained Android APK. Stability, dependability, and complete control over the user experience are thereby guaranteed.