Adding assets and images

Contents

Flutter apps can include both code and *assets* (sometimes called resources). An asset is a file that is bundled and deployed with your app, and is accessible at runtime. Common types of assets include static data (for example, JSON files), configuration files, icons, and images (JPEG, WebP, GIF, animated WebP/GIF, PNG, BMP, and WBMP).

Specifying assets

Flutter uses the `pubspec.yaml` file, located at the root of your project, to identify assets required by an app.

Here is an example:

```
flutter:
  assets:
    - assets/my_icon.png
    - assets/background.png
```

To include all assets under a directory, specify the directory name with the `/` character at the end:

```
flutter:
  assets:
    - assets/
```

Note that only files located directly in the directory are included. To add files located in subdirectories, create an entry per director

Asset bundling

The `assets` subsection of the `flutter` section specifies files that should be included with the app. Each asset is identified by an explicit path (relative to the `pubspec.yaml` file) where the asset file is located. The order in which the assets are declared does not matter. The actual directory used (`assets` in this case) does not matter.

During a build, Flutter places assets into a special archive called the *asset bundle*, which apps can read from at runtime.

Asset variants

The build process supports the notion of asset variants: different versions of an asset that might be displayed in different context When an asset's path is specified in the `assets` section of `pubspec.yaml`, the build process looks for any files with the same name adjacent subdirectories. Such files are then included in the asset bundle along with the specified asset.

For example, if you have the following files in your application directory:

```
.../pubspec.yaml
.../graphics/my_icon.png
.../graphics/background.png
.../graphics/dark/background.png
...etc.
```

And your `pubspec.yaml` file contains the following:

```
flutter:
  assets:
    - graphics/background.png
```

Then both `graphics/background.png` and `graphics/dark/background.png` are included in your asset bundle. The former is considered the *main asset*, while the latter is considered a *variant*.

If, on the other hand, the graphics directory is specified:

```
flutter:
  assets:
    - graphics/
```

Then the `graphics/my_icon.png`, `graphics/background.png` and `graphics/dark/background.png` files are also included.

Flutter uses asset variants when choosing resolution-appropriate images. In the future, this mechanism might be extended to incl variants for different locales or regions, reading directions, and so on.

Loading assets

Your app can access its assets through an `AssetBundle` object.

The two main methods on an asset bundle allow you to load a string/text asset (`loadString()`) or an image/binary asset (`load()` out of the bundle, given a logical key. The logical key maps to the path to the asset specified in the `pubspec.yaml` file at build time

Loading text assets

Each Flutter app has a `rootBundle` object for easy access to the main asset bundle. It is possible to load assets directly using the `rootBundle` global static from `package:flutter/services.dart`.

However, it's recommended to obtain the AssetBundle for the current BuildContext using `DefaultAssetBundle`. Rather than the default asset bundle that was built with the app, this approach enables a parent widget to substitute a different AssetBundle at ru time, which can be useful for localization or testing scenarios.

Typically, you'll use `DefaultAssetBundle.of()` to indirectly load an asset, for example a JSON file, from the app's runtime `rootBundle`.

Outside of a Widget context, or when a handle to an AssetBundle is not available, you can use `rootBundle` to directly load such assets. For example:

```
import 'dart:async' show Future;
import 'package:flutter/services.dart' show rootBundle;

Future<String> loadAsset() async {
  return await rootBundle.loadString('assets/config.json');
}
```

Loading images

Flutter can load resolution-appropriate images for the current device pixel ratio.

Declaring resolution-aware image assets

`AssetImage` understands how to map a logical requested asset onto one that most closely matches the current device pixel ratio. order for this mapping to work, assets should be arranged according to a particular directory structure:

```
.../image.png
.../Mx/image.png
.../Nx/image.png
...etc.
```

Where *M* and *N* are numeric identifiers that correspond to the nominal resolution of the images contained within. In other words, t specify the device pixel ratio that the images are intended for.

The main asset is assumed to correspond to a resolution of 1.0. For example, consider the following asset layout for an image named `my_icon.png`:

```
.../my_icon.png
.../2.0x/my_icon.png
.../3.0x/my_icon.png
```

On devices with a device pixel ratio of 1.8, the asset `.../2.0x/my_icon.png` would be chosen. For a device pixel ratio of 2.7, the asset `.../3.0x/my_icon.png` would be chosen.

If the width and height of the rendered image are not specified on the `Image` widget, the nominal resolution is used to scale the as so that it occupies the same amount of screen space as the main asset would have, just with a higher resolution. That is, if `.../my_icon.png` is 72px by 72px, then `.../3.0x/my_icon.png` should be 216px by 216px; but they both render into 72px by 72p logical pixels) if width and height are not specified.

Each entry in the asset section of the `pubspec.yaml` should correspond to a real file, with the exception of the main asset entry. If main asset entry does not correspond to a real file, then the asset with the lowest resolution is used as the fallback for devices wi device pixel ratios below that resolution. The entry should still be included in the `pubspec.yaml` manifest, however.

Loading images

To load an image, use the `AssetImage` class in a widget's `build` method.

For example, your app can load the background image from the asset declarations above:

```
Widget build(BuildContext context) {
  return Image(image: AssetImage('graphics/background.png'));
}
```

Anything using the default asset bundle inherits resolution awareness when loading images. (If you work with some of the lower l classes, like `ImageStream` or `ImageCache`, you'll also notice parameters related to scale.)

Asset images in package dependencies

To load an image from a package dependency, the `package` argument must be provided to `AssetImage`.

For instance, suppose your application depends on a package called `my_icons`, which has the following directory structure:

```
.../pubspec.yaml
.../icons/heart.png
.../icons/1.5x/heart.png
.../icons/2.0x/heart.png
...etc.
```

To load the image, use:

```
AssetImage('icons/heart.png', package: 'my_icons')
```

Assets used by the package itself should also be fetched using the `package` argument as above.

Bundling of package assets

If the desired asset is specified in the `pubspec.yaml` file of the package, it's bundled automatically with the application. In particul assets used by the package itself must be specified in its `pubspec.yaml`.

A package can also choose to have assets in its `lib/` folder that are not specified in its `pubspec.yaml` file. In this case, for those images to be bundled, the application has to specify which ones to include in its `pubspec.yaml`. For instance, a package named `fancy_backgrounds` could have the following files:

```
.../lib/backgrounds/background1.png
.../lib/backgrounds/background2.png
.../lib/backgrounds/background3.png
```

To include, say, the first image, the `pubspec.yaml` of the application should specify it in the `assets` section:

```
flutter:
  assets:
    - packages/fancy_backgrounds/backgrounds/background1.png
```

The `lib/` is implied, so it should not be included in the asset path.

Sharing assets with the underlying platform

Flutter assets are readily available to platform code via AssetManager on Android and NSBundle on iOS.

Loading Flutter assets in Android

On Android the assets are available via the AssetManager API. The lookup key used in, for instance openFd, is obtained from `lookupKeyForAsset` on PluginRegistry.Registrar or `getLookupKeyForAsset` on FlutterView. `PluginRegistry.Registrar` is availab when developing a plugin while `FlutterView` would be the choice when developing an app including a platform view.

As an example, suppose you have specified the following in your pubspec.yaml

```
flutter:
  assets:
    - icons/heart.png
```

This reflects the following structure in your Flutter app.

```
.../pubspec.yaml
.../icons/heart.png
...etc.
```

To access `icons/heart.png` from your Java plugin code, do the following:

```
AssetManager assetManager = registrar.context().getAssets();
String key = registrar.lookupKeyForAsset("icons/heart.png");
AssetFileDescriptor fd = assetManager.openFd(key);
```

Loading Flutter assets in iOS

On iOS the assets are available via the mainBundle. The lookup key used in, for instance pathForResource:ofType:, is obtained fror `lookupKeyForAsset` or `lookupKeyForAsset:fromPackage:` on FlutterPluginRegistrar, or `lookupKeyForAsset:` or `lookupKeyForAsset:fromPackage:` on FlutterViewController. `FlutterPluginRegistrar` is available when developing a plugin whi `FlutterViewController` would be the choice when developing an app including a platform view.

As an example, suppose you have the Flutter setting from above.

To access `icons/heart.png` from your Objective-C plugin code you would do the following:

```
NSString* key = [registrar lookupKeyForAsset:@"icons/heart.png"];
NSString* path = [[NSBundle mainBundle] pathForResource:key ofType:nil];
```

For a more complete example, see the implementation of the Flutter video_player plugin.

The plugin ios_platform_images on pub.dev wraps up this logic in a convenient category. It allows writing:

Objective-C:

```
[UIImage flutterImageWithName:@"icons/heart.png"];
```

Swift:

```
UIImage.flutterImageNamed("icons/heart.png")
```

Loading iOS images in Flutter

When implementing Flutter as Add-to-app, you might have images hosted in iOS which you want to use in Flutter. For accomplishi that there is a plugin available on pub.dev called ios_platform_images.

Platform assets

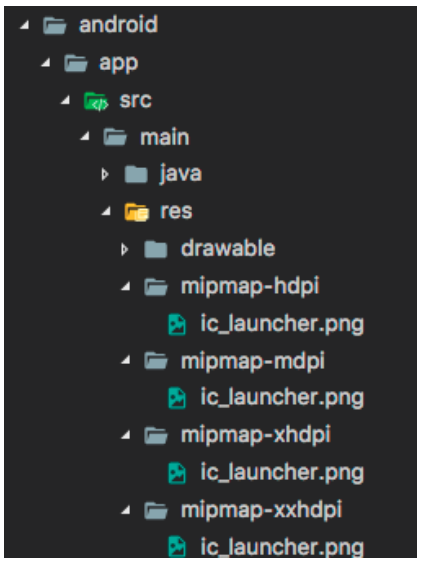
There are other occasions to work with assets in the platform projects directly. Below are two common cases where assets are us before the Flutter framework is loaded and running.

Updating the app icon

Updating a Flutter application's launch icon works the same way as updating launch icons in native Android or iOS applications.

Android

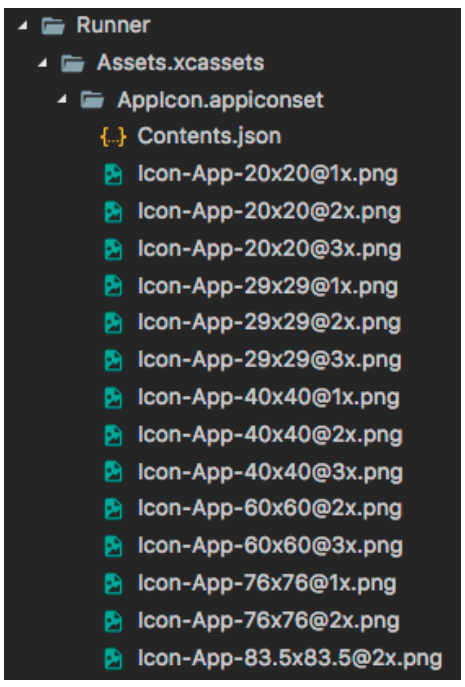
In your Flutter project's root directory, navigate to `.../android/app/src/main/res`. The various bitmap resource folders such as `mipmap-hdpi` already contain placeholder images named `ic_launcher.png`. Replace them with your desired assets respecting the recommended icon size per screen density as indicated by the Android Developer Guide.



Note: If you rename the .png files, you must also update the corresponding name in your `AndroidManifest.xml`'s `<application>` tag's `android:icon` attribute.

iOS

In your Flutter project's root directory, navigate to `.../ios/Runner`. The `Assets.xcassets/AppIcon.appiconset` directory already contains placeholder images. Replace them with the appropriately sized images as indicated by their filename as dictated by the Apple Human Interface Guidelines. Keep the original file names.



Updating the launch screen

Flutter also uses native platform mechanisms to draw transitional launch screens to your Flutter app while the Flutter framework loads. This launch screen persists until Flutter renders the first frame of your application.

Note: This implies that if you don't call `runApp()` in the `main()` function of your app (or more specifically, if you don't call `window.render()` in response to `window.onDrawFrame`), the launch screen persists forever.

Android

To add a "splash screen" to your Flutter application, navigate to `.../android/app/src/main`. In `res/drawable/launch_background.xml`, use this layer list drawable XML to customize the look of your launch screen. The existin template provides an example of adding an image to the middle of a white splash screen in commented code. You can uncomme or use other drawables to achieve the intended effect.

For more details, see Adding a splash screen and launch screen to an Android app.

iOS

To add an image to the center of your “splash screen”, navigate to `.../ios/Runner`. In `Assets.xcassets/LaunchImage.imageset`, drop in images named `LaunchImage.png`, `LaunchImage@2x.png`, `LaunchImage@3x.png`. If you use different filenames, update the `Contents.json` file in the same directory.

You can also fully customize your launch screen storyboard in Xcode by opening `.../ios/Runner.xcworkspace`. Navigate to `Runner/Runner` in the Project Navigator and drop in images by opening `Assets.xcassets` or do any customization using the Interface Builder in `LaunchScreen.storyboard`.