OPTIMALHR

Information Technologies

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Intro to Flutter SDK

The Future of Mobile Development

What is Flutter SDK?

- A cross-platform mobile app SDK for:
  - Android
  - iOS
  - Fuchsia
- Uses Dart Language
- Rich Widget Catalog
- Modern, Reactive Framework

Learn more:
www.flutter.dev

Hold on… what is Dart?

What is Dart?

- Object Oriented Language
- C-Style Syntax
- Statically Typed
- Runtime Environments
- Supports JIT and AOT compilation
- Built-in Libraries

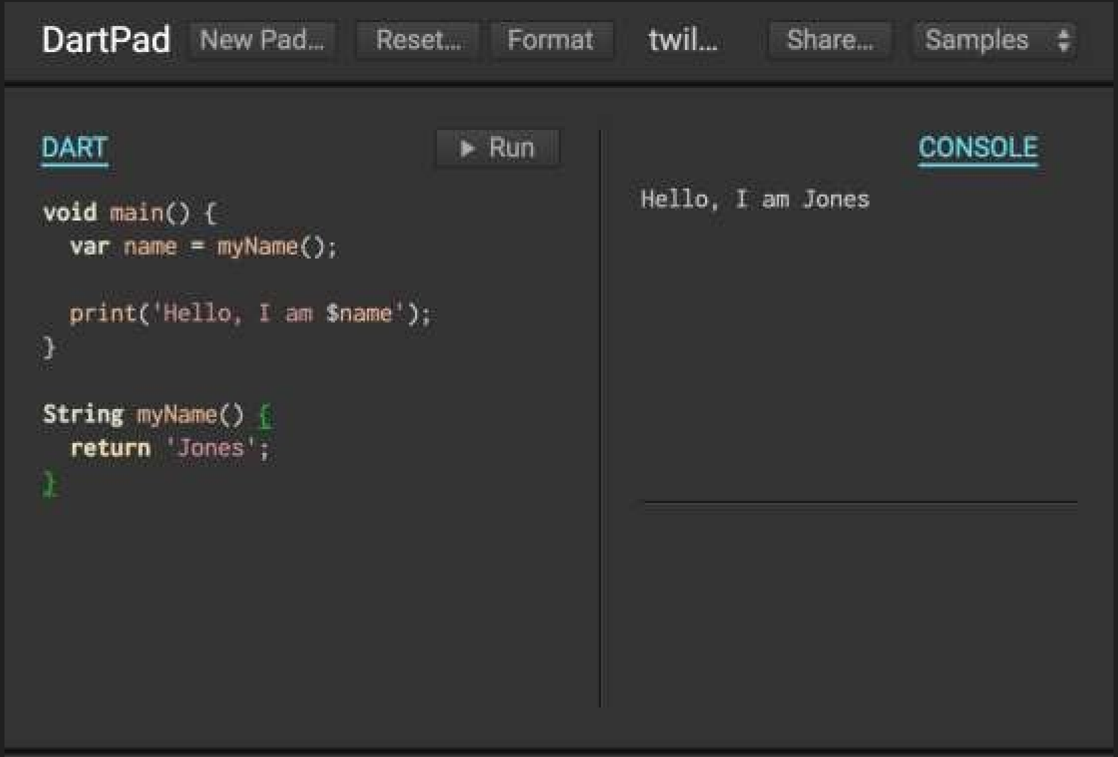
Learn more:

www.dart.dev

Dart Basics

Dart Pad Editor:
dartpad.dartlang.org

- Functions
- Variables & Values
- Types
- Classes



```
void main() {
  var name = myName();

  print('Hello, I am $name');
}

String myName() {
  return 'Jones';
}
```

```
Hello, I am Jones
```

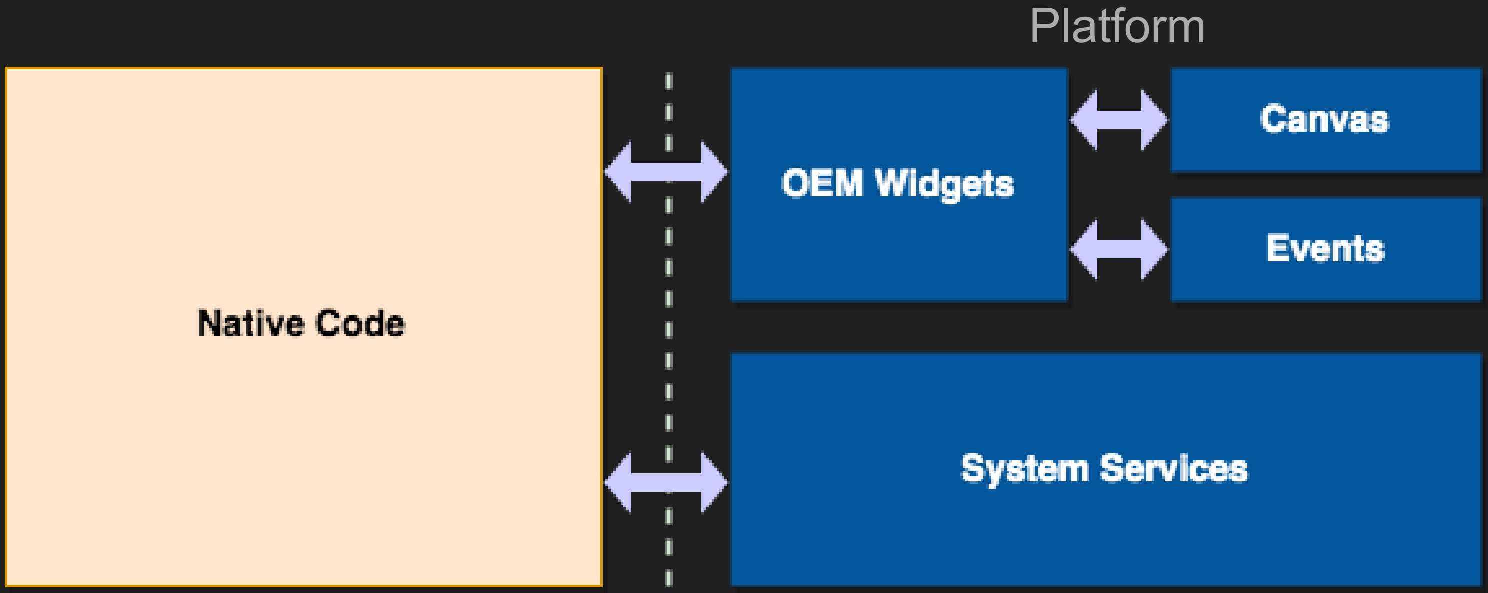
Ok, Back to Flutter SDK...

Why Flutter SDK?

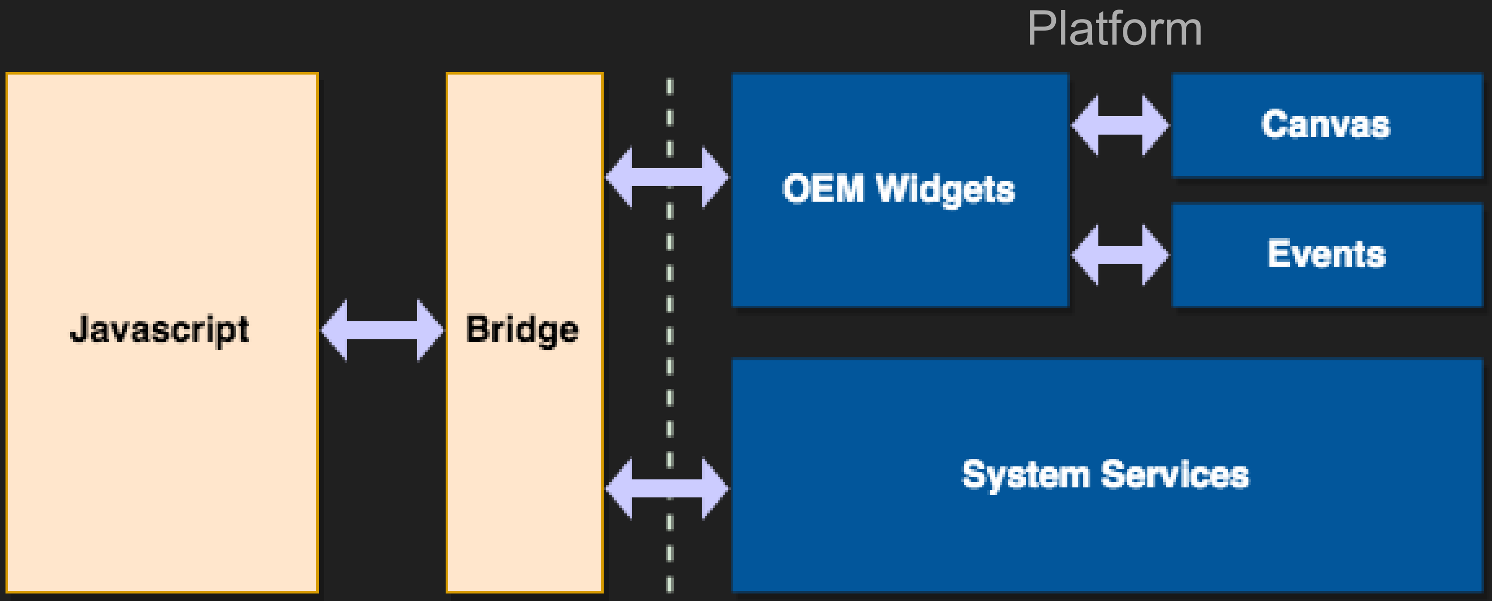
- Beautiful UIs that is consistent across devices and manufacturers
- High-performance apps that feel natural on different platforms
- Up to 120fps
- Fast development - Hot Reload

Learn more:
www.flutter.dev

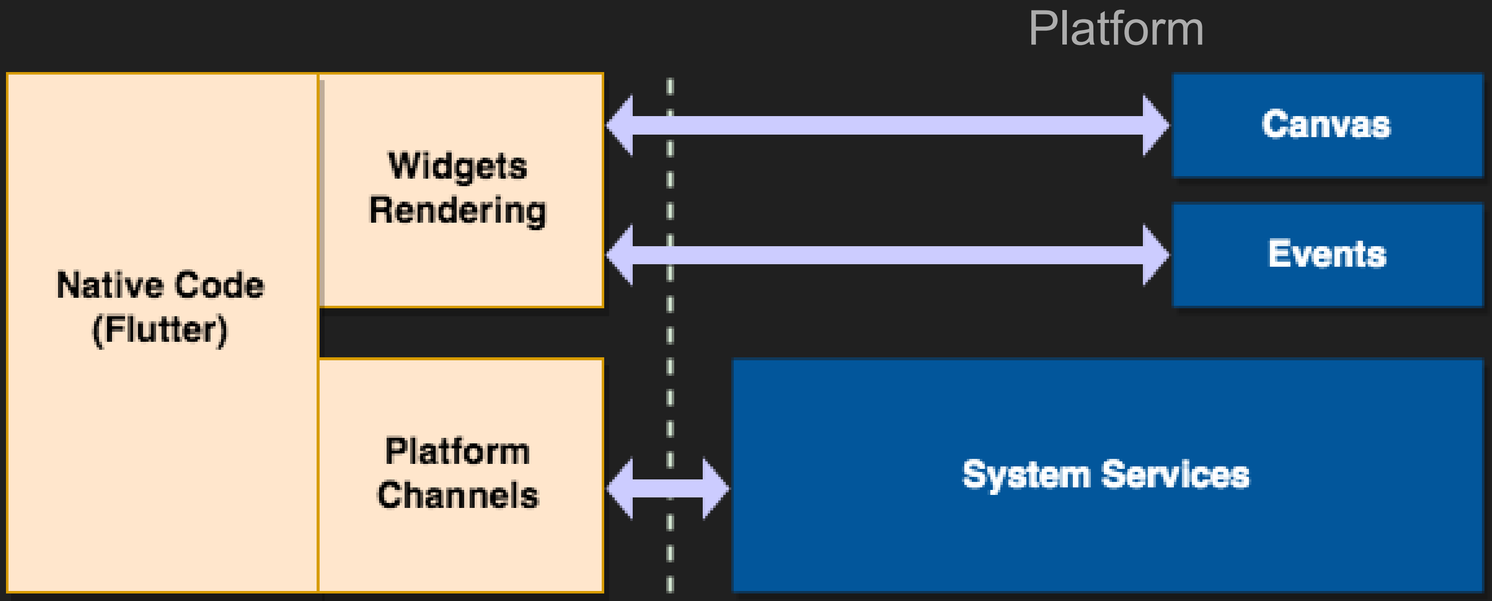
Platform SDKs (Android and iOS)



Reactive Web Frameworks

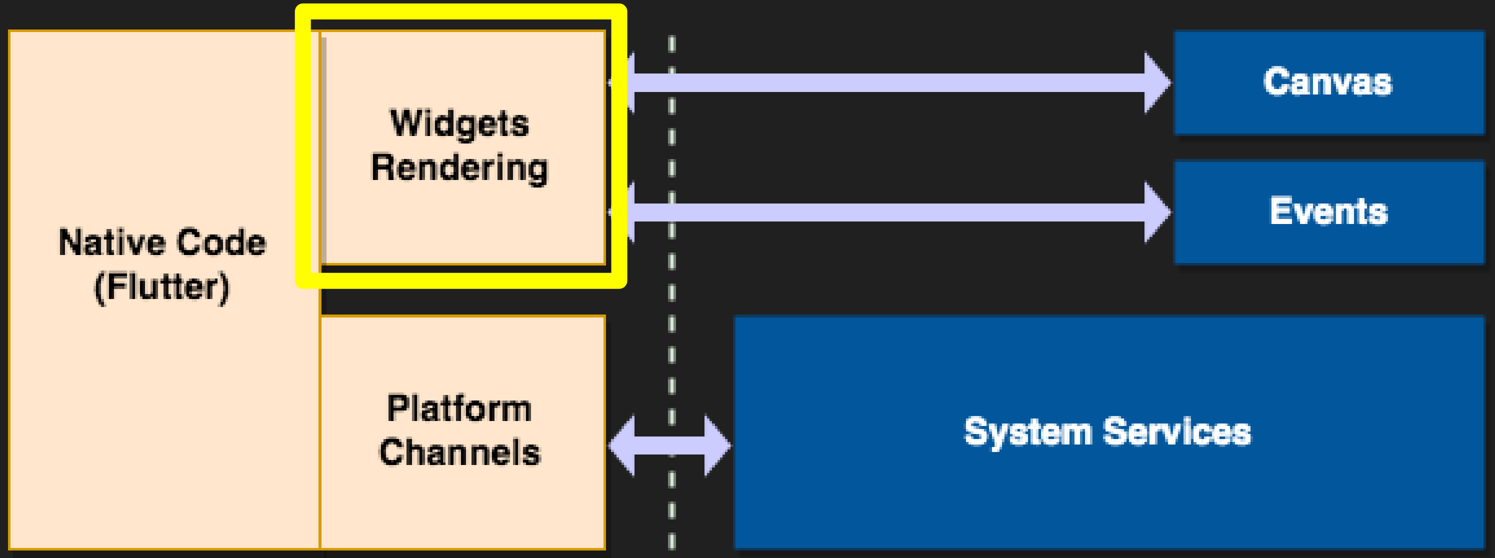


Flutter SDK


Platform
Native Code (Flutter)
Widgets Rendering
Platform Channels
Canvas
Events
System Services

Flutter SDK Concepts

Widgets Rendering

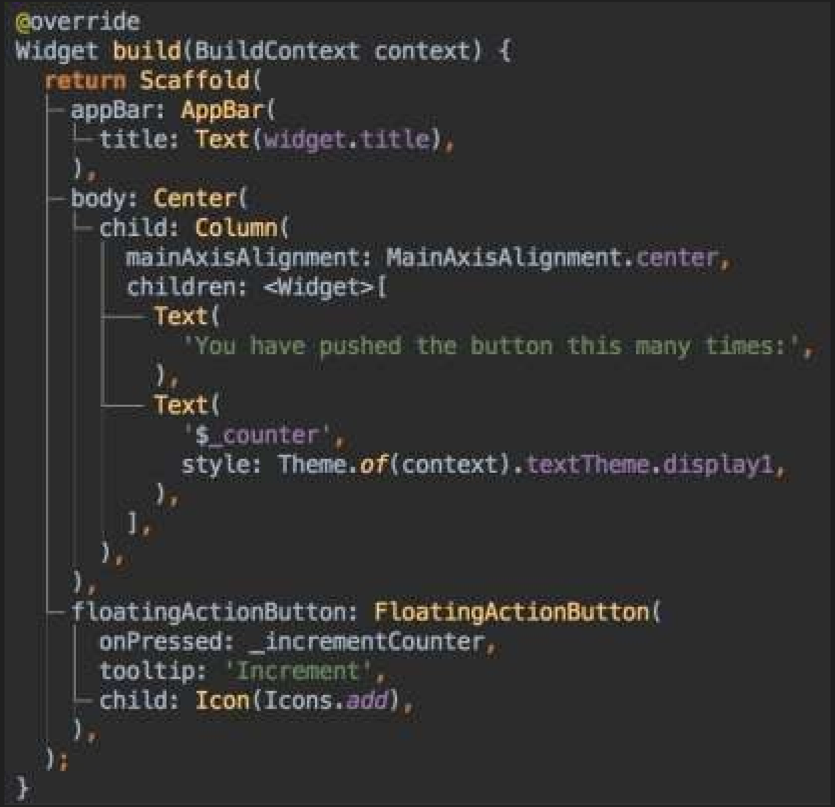


Everything is a Widget!

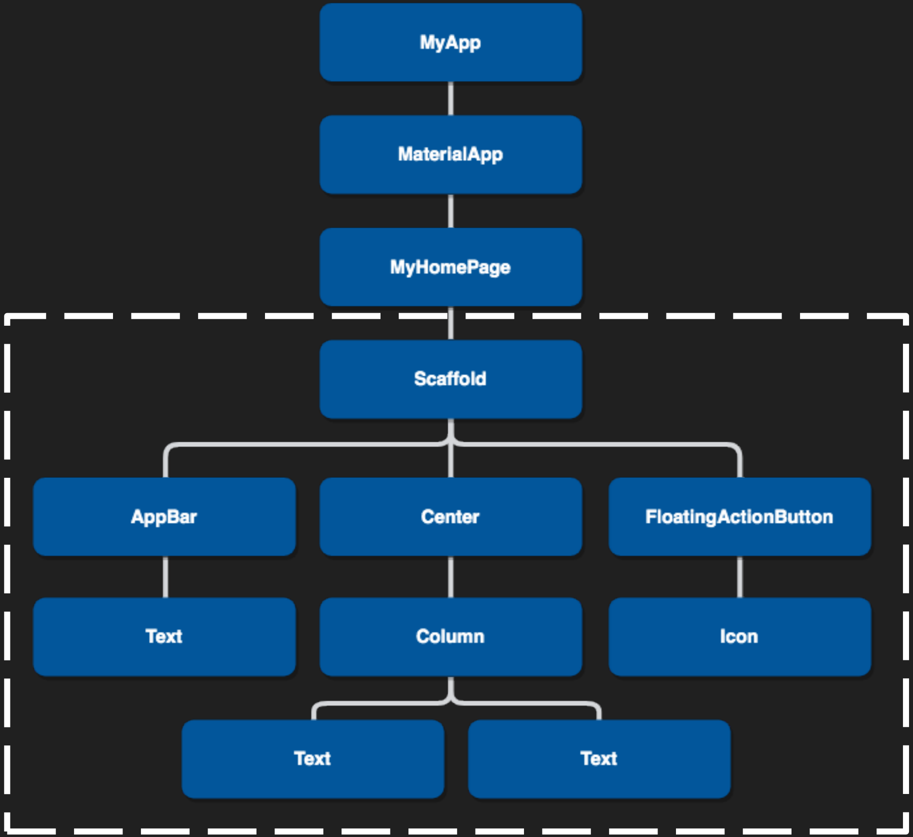
What are Widgets?

- Building blocks of UI in Flutter
- Even the App itself is a widget
- Advanced widgets are made by combining basic widgets
- Can represent:
  - UI Element
  - Layout Element
  - New Screens

Widget Tree

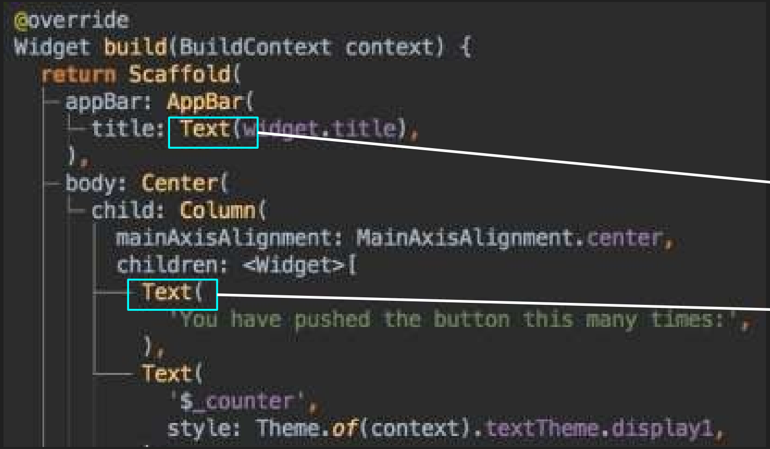


```
@override
Widget build(BuildContext context) {
  return Scaffold(
    appBar: AppBar(
      title: Text(widget.title),
    ),
    body: Center(
      child: Column(
        mainAxisAlignment: MainAxisAlignment.center,
        children: <Widget>[
          Text(
            'You have pushed the button this many times:',
          ),
          Text(
            '$_counter',
            style: Theme.of(context).textTheme.display1,
          ),
        ],
      ),
    ),
    floatingActionButton: FloatingActionButton(
      onPressed: _incrementCounter,
      tooltip: 'Increment',
      child: Icon(Icons.add),
    ),
  );
}
```

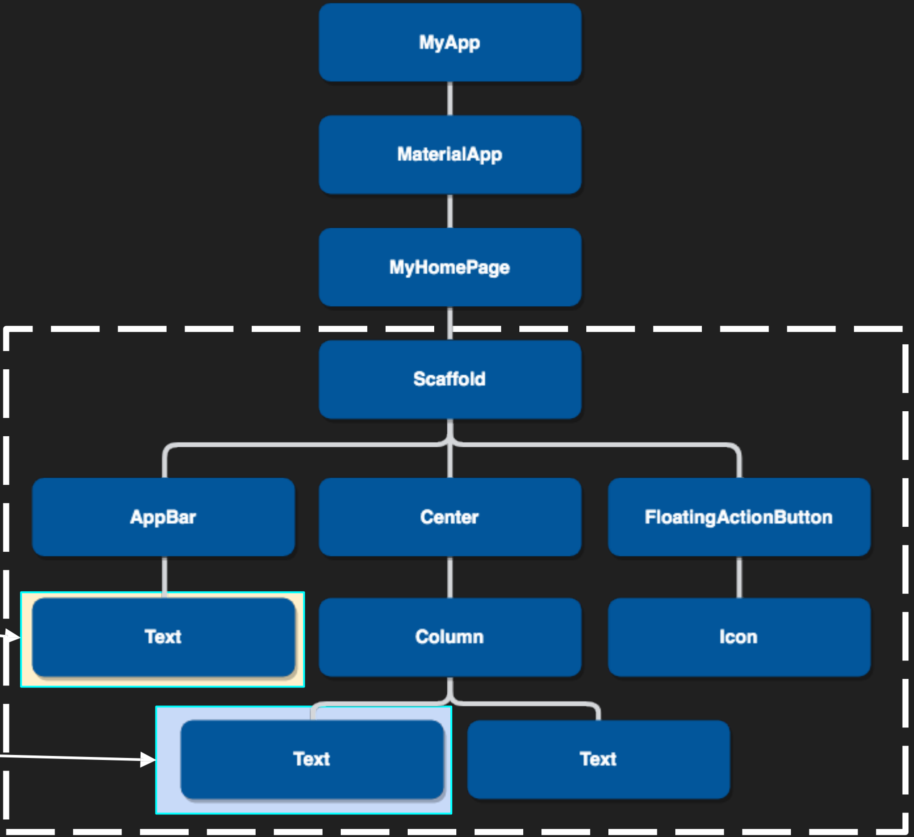


BuildContext

- reference to the location of a Widget within the Widget Tree structure
- Belongs to one widget



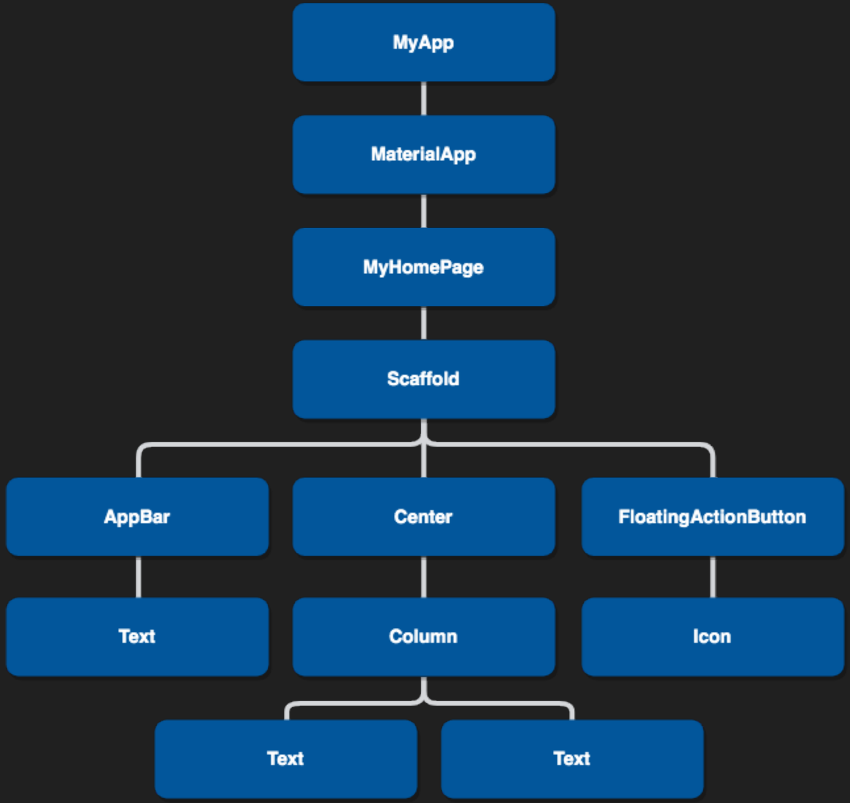
```
@override
Widget build(BuildContext context) {
  return Scaffold(
    appBar: AppBar(
      title: Text(widget.title),
    ),
    body: Center(
      child: Column(
        mainAxisAlignment: MainAxisAlignment.center,
        children: <Widget>[
          Text(
            'You have pushed the button this many times:',
          ),
          Text(
            '$_counter',
            style: Theme.of(context).textTheme.display1,
```



BuildContext Visibility

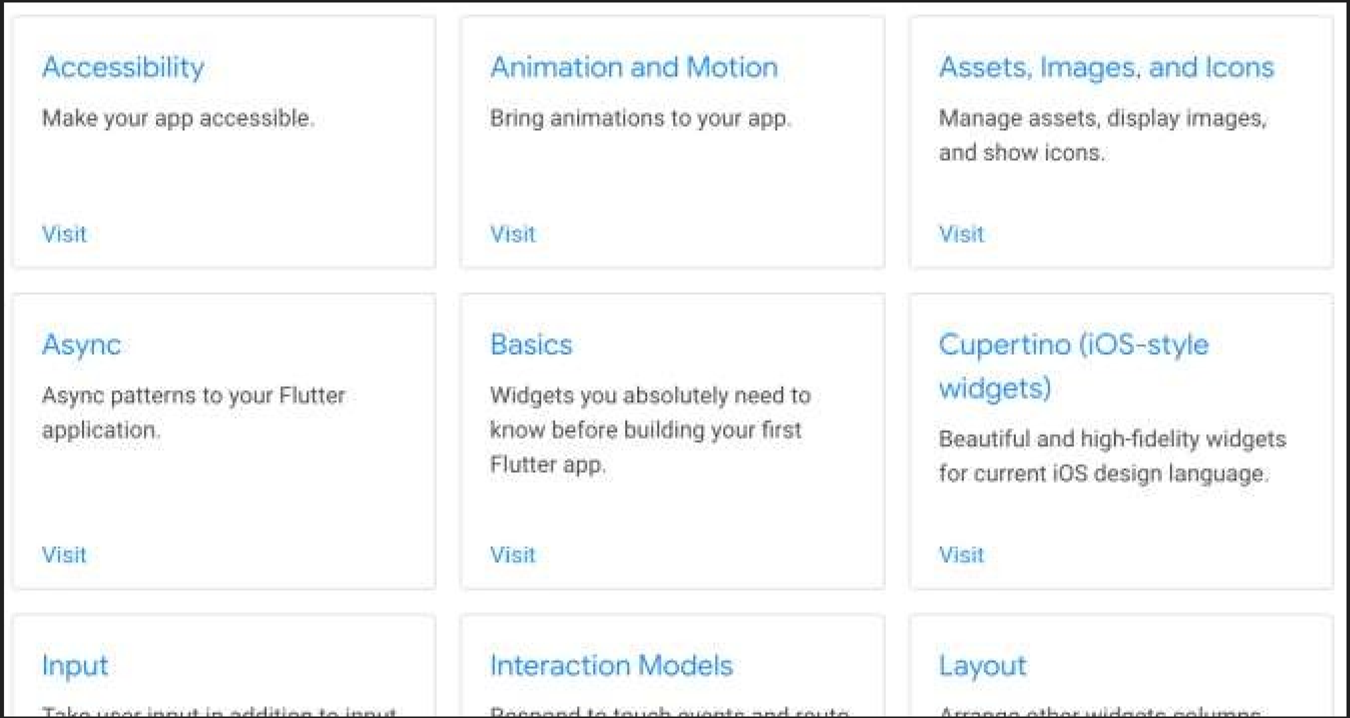
- ‘Something’ is only visible within its own BuildContext or in the BuildContext of its parent(s) BuildContext
- An example:

  Theme.of(context)



Widgets Catalog

https://flutter.dev/docs/development/ui/widgets



Accessibility

Make your app accessible.

Visit

Animation and Motion

Bring animations to your app.

Visit

Assets, Images, and Icons

Manage assets, display images, and show icons.

Visit

Async

Async patterns to your Flutter application.

Visit

Basics

Widgets you absolutely need to know before building your first Flutter app.

Visit

Cupertino (iOS-style widgets)

Beautiful and high-fidelity widgets for current iOS design language.

Visit

Input

Take user input in addition to input

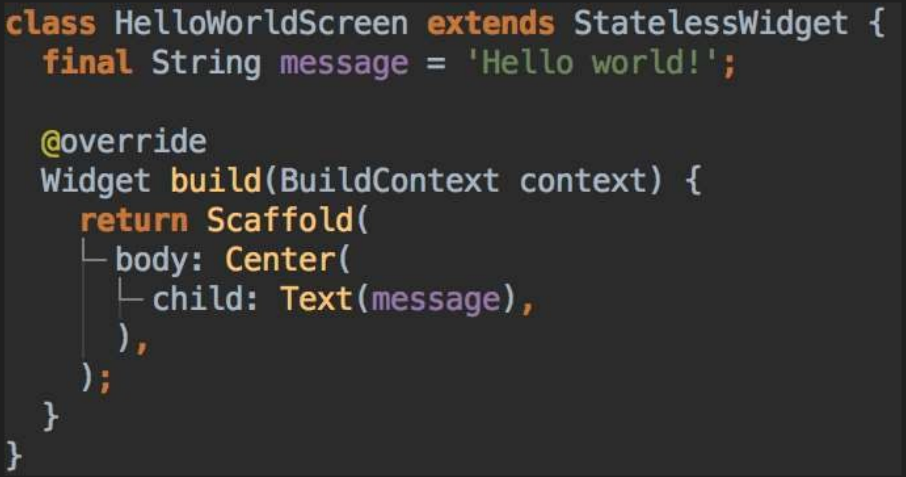
Interaction Models

Respond to touch events and route

Layout

Arrange other widgets columns

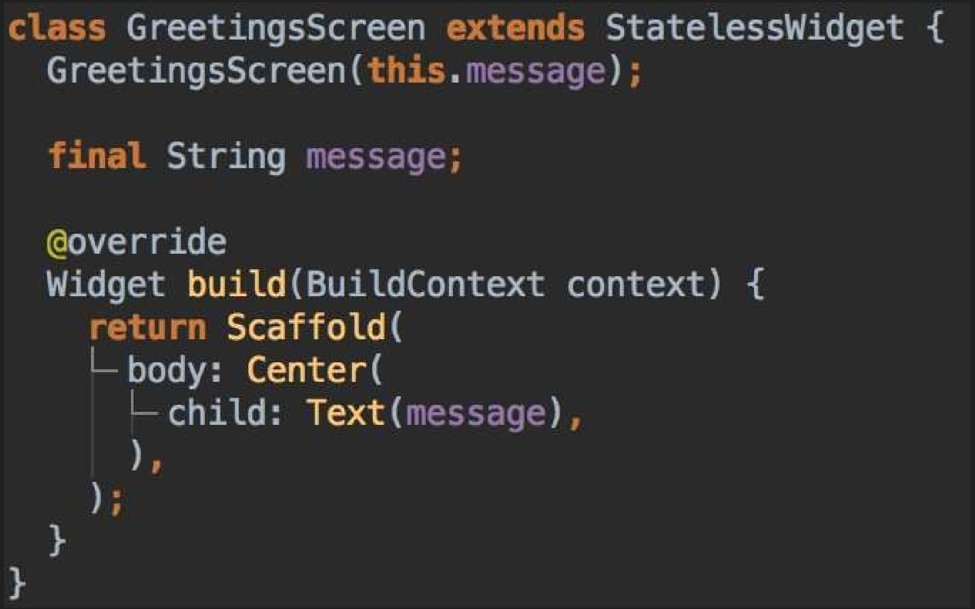
Stateless Widgets



```
class HelloWorldScreen extends StatelessWidget {
  final String message = 'Hello world!';

  @override
  Widget build(BuildContext context) {
    return Scaffold(
      body: Center(
        child: Text(message),
      ),
    );
  }
}
```

- Immutable
- Once created, it doesn’t change

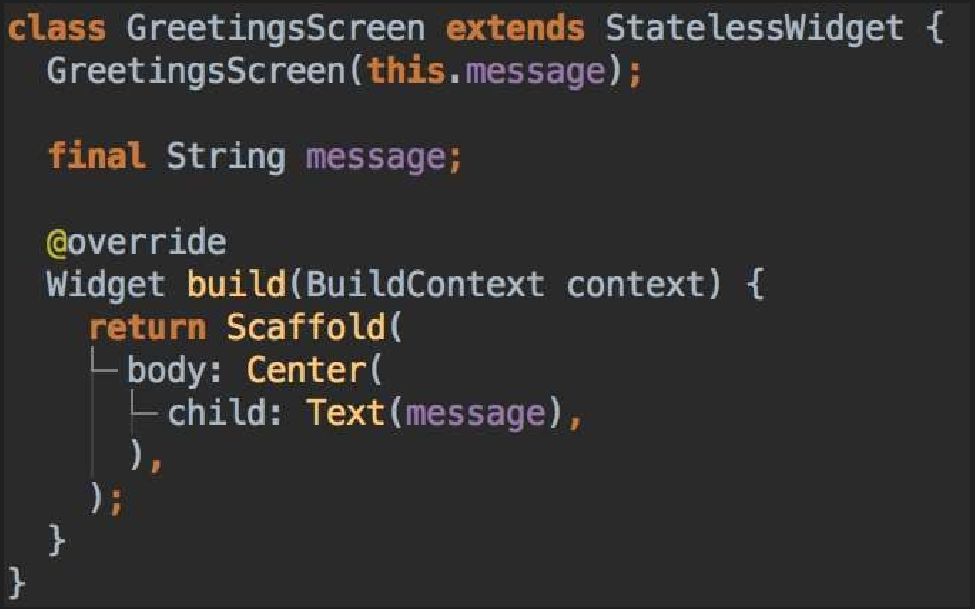
Stateless Widgets



```
class GreetingsScreen extends StatelessWidget {
  GreetingsScreen(this.message);

  final String message;

  @override
  Widget build(BuildContext context) {
    return Scaffold(
    └body: Center(
      └child: Text(message),
      ),
    );
  }
}
```

- Can pass parameters to Widgets, but once applied, it will not change until the next build process

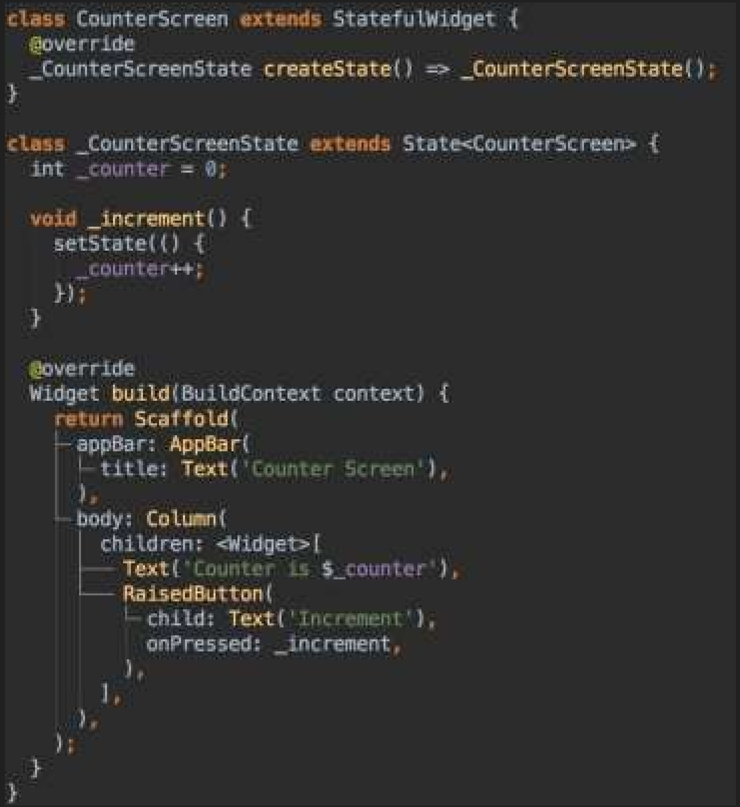
Stateless Widgets - Lifecycle



```
class GreetingsScreen extends StatelessWidget {
  GreetingsScreen(this.message);

  final String message;

  @override
  Widget build(BuildContext context) {
    return Scaffold(
      body: Center(
        child: Text(message),
      ),
    );
  }
}
```

- Initialization
- build()

Stateful Widgets



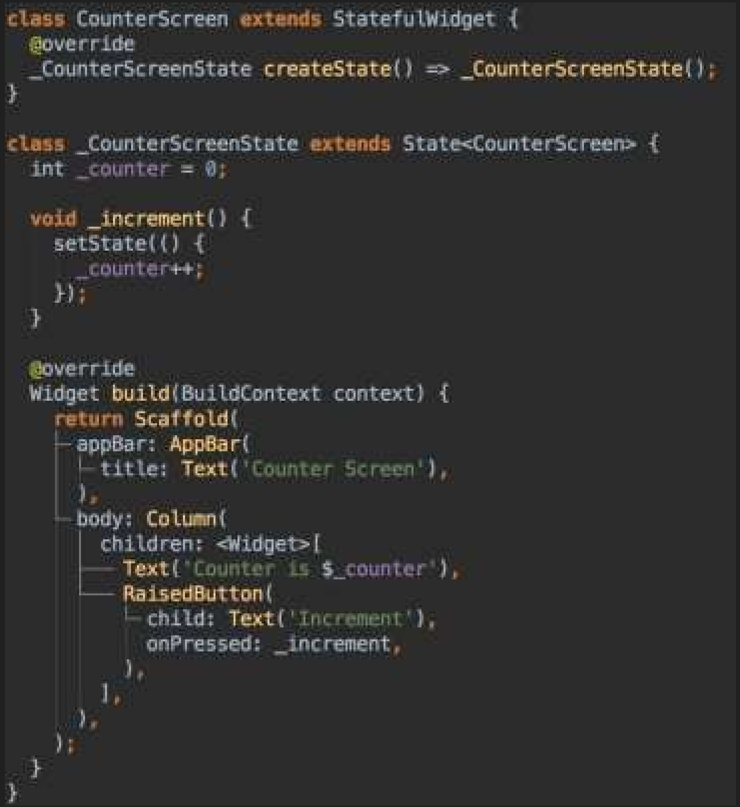
```dart
class CounterScreen extends StatefulWidget {
  @override
  _CounterScreenState createState() => _CounterScreenState();
}

class _CounterScreenState extends State<CounterScreen> {
  int _counter = 0;

  void _increment() {
    setState(() {
      _counter++;
    });
  }

  @override
  Widget build(BuildContext context) {
    return Scaffold(
      appBar: AppBar(
        title: Text('Counter Screen'),
      ),
      body: Column(
        children: <Widget>[
          Text('Counter is $_counter'),
          RaisedButton(
            child: Text('Increment'),
            onPressed: _increment,
          ),
        ],
      ),
    );
  }
}
```

- Have a “State”
- State - set of data held by a widget that can change in its lifetime

Stateful Widgets - State

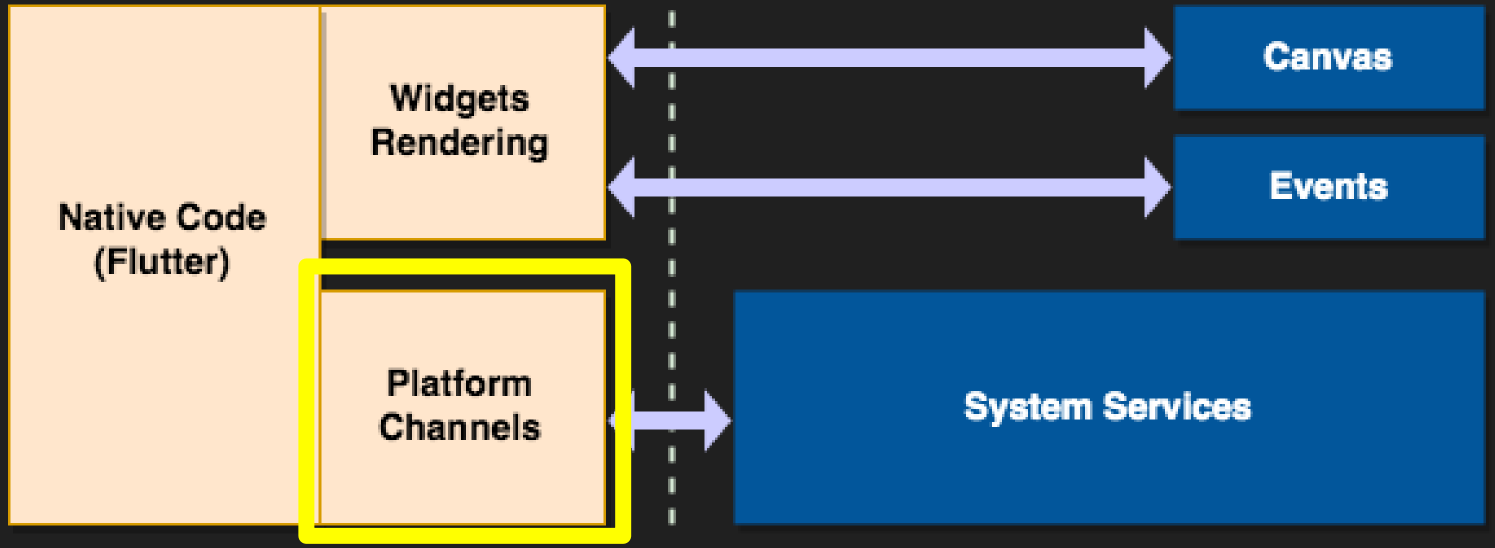
- State defines the information on how to interact with the Widget in terms of:
  - Behaviour
  - Layout
- Any changes to State will trigger the Widget to rebuild
- State is associated with BuildContext
- A State is considered **mounted** only when the State is associated with the BuildContext

Stateful Widgets - Lifecycle


```
class CounterScreen extends StatefulWidget {
  @override
  _CounterScreenState createState() => _CounterScreenState();
}

class _CounterScreenState extends State<CounterScreen> {
  int _counter = 0;

  void _increment() {
    setState(() {
      _counter++;
    });
  }

  @override
  Widget build(BuildContext context) {
    return Scaffold(
      appBar: AppBar(
        title: Text('Counter Screen'),
      ),
      body: Column(
        children: <Widget>[
          Text('Counter is $_counter'),
          RaisedButton(
            child: Text('Increment'),
            onPressed: _increment,
          ),
        ],
      ),
    );
  }
}
```

- initState()
- didChangeDependencies()
- build()
- dispose()

Integration With The Platform

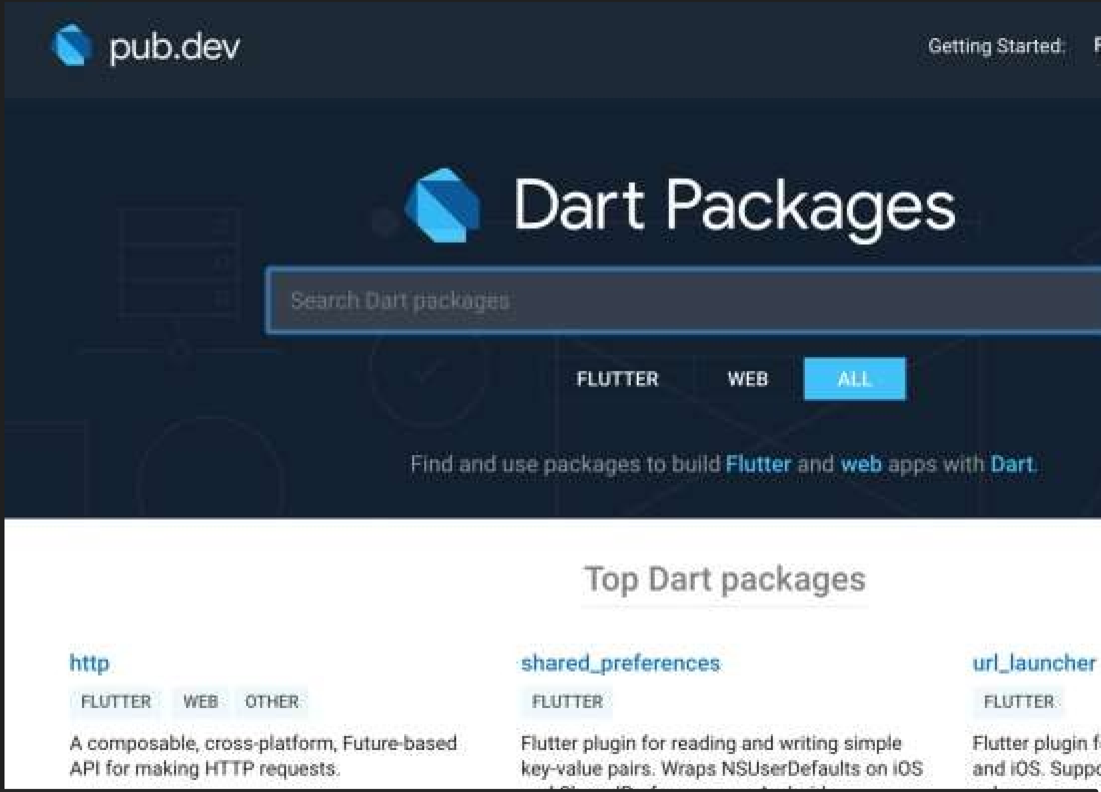


Native Plugins

- Allow access to Native API
  - Bluetooth, geolocation, sharedPrefs, etc.
- Official and Community-driven plugins available
- Still some missing plugins or still in early stage
- Add package if it is available, otherwise, build a custom plugin

Dependency Management

- Pub package manager
- Official site https://pub.dev
- Can use Git repo for custom dependencies



Find and use packages to build Flutter and web apps with Dart.

Top Dart packages

http
FLUTTER WEB OTHER
A composable, cross-platform, Future-based API for making HTTP requests.

shared_preferences
FLUTTER
Flutter plugin for reading and writing simple key-value pairs. Wraps NSUserDefaults on iOS

url_launcher
FLUTTER
Flutter plugin
and iOS. Supp

Example Package

- Add Package in pubspec.yaml

```
dependencies:
 battery: ^0.3.0+3
```

- Add import package to Dart file

```
import 'package:battery/battery.dart';
```

- Use class from the Imported Package

```
 Battery _battery = Battery();

 final int batteryLevel = await _battery.batteryLevel;
```

Getting Started

Getting Started

- Download installation bundle

flutter_macos_v1.5.4-hotfix.2-stable.zip

- Unzip to desired directory

```
$ cd ~/development
$ unzip ~/Downloads/flutter_macos_v1.5.4-hotfix.2-stable.zip
```

Getting Started...

- Add flutter/bin to your PATH
- Run Flutter Doctor to check for next steps
- Platform Setup:
  - Android
  - IOS
- Setup your IDE
  - Recommended: Android Studio
  - Install plugins for your IDE

Creating A New Flutter App

- Go to your workspace directory

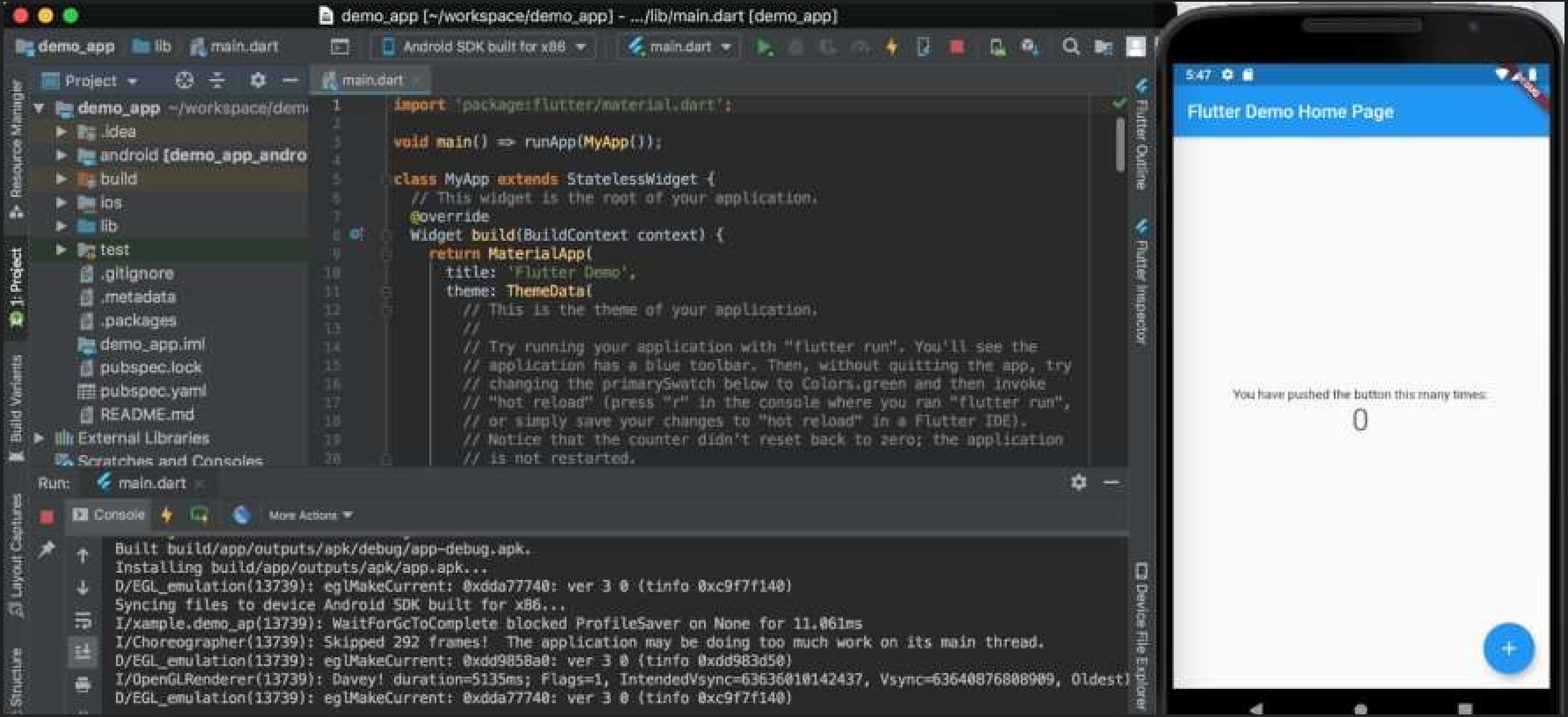
```
$ cd ~/workspace
```

- Enter the ‘flutter create’ command

```
$ flutter create demo_app
```

- Open the project on the IDE

The Flutter Demo App



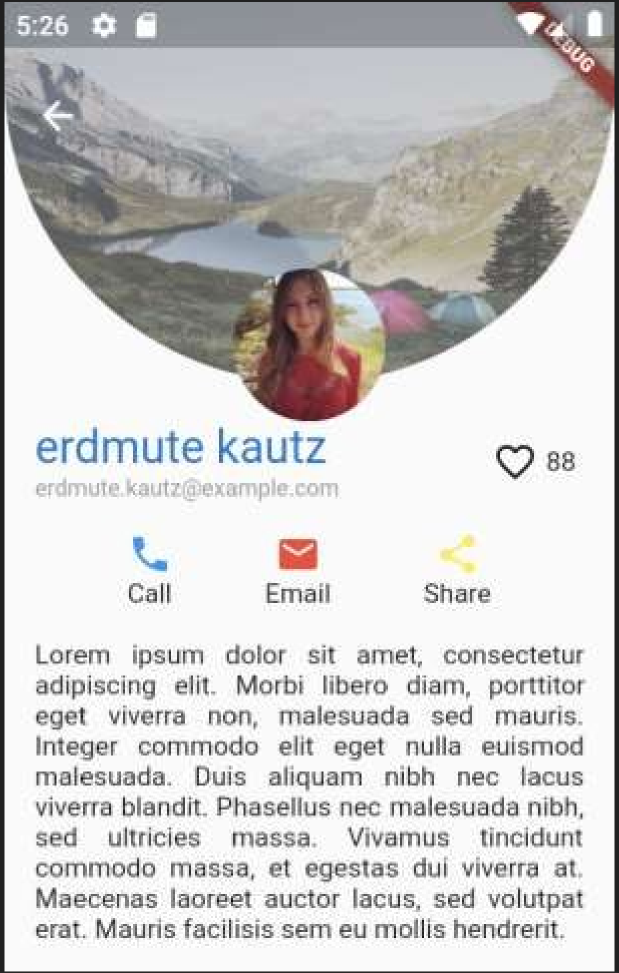
```
import 'package:flutter/material.dart';

void main() => runApp(MyApp());

class MyApp extends StatelessWidget {
  // This widget is the root of your application.
  @override
  Widget build(BuildContext context) {
    return MaterialApp(
      title: 'Flutter Demo',
      theme: ThemeData(
        // This is the theme of your application.
        //
        // Try running your application with "flutter run". You'll see the
        // application has a blue toolbar. Then, without quitting the app, try
        // changing the primarySwatch below to Colors.green and then invoke
        // "hot reload" (press "r" in the console where you ran "flutter run",
        // or simply save your changes to "hot reload" in a Flutter IDE).
        // Notice that the counter didn't reset back to zero; the application
        // is not restarted.
```

```
Built build/app/outputs/apk/debug/app-debug.apk.
Installing build/app/outputs/apk/app.apk...
D/EGL_emulation(13739): eglMakeCurrent: 0xdda77740: ver 3 0 (tinfo 0xc9f7f140)
Syncing files to device Android SDK built for x86...
I/xample.demo_ap(13739): WaitForGcToComplete blocked ProfileSaver on None for 11.061ms
I/Choreographer(13739): Skipped 292 frames!  The application may be doing too much work on its main thread.
D/EGL_emulation(13739): eglMakeCurrent: 0xdd9858a0: ver 3 0 (tinfo 0xdd983d50)
I/OpenGLRenderer(13739): Davey! duration=5135ms; Flags=1, IntendedVsync=63636010142437, Vsync=63640876808909, Oldest
D/EGL_emulation(13739): eglMakeCurrent: 0xdda77740: ver 3 0 (tinfo 0xc9f7f140)
```

Demo - Building Layouts

- Create a simple Flutter Screen

Please download files:
https://bit.ly/2HXShzS



erdmute kautz

erdmute.kautz@example.com

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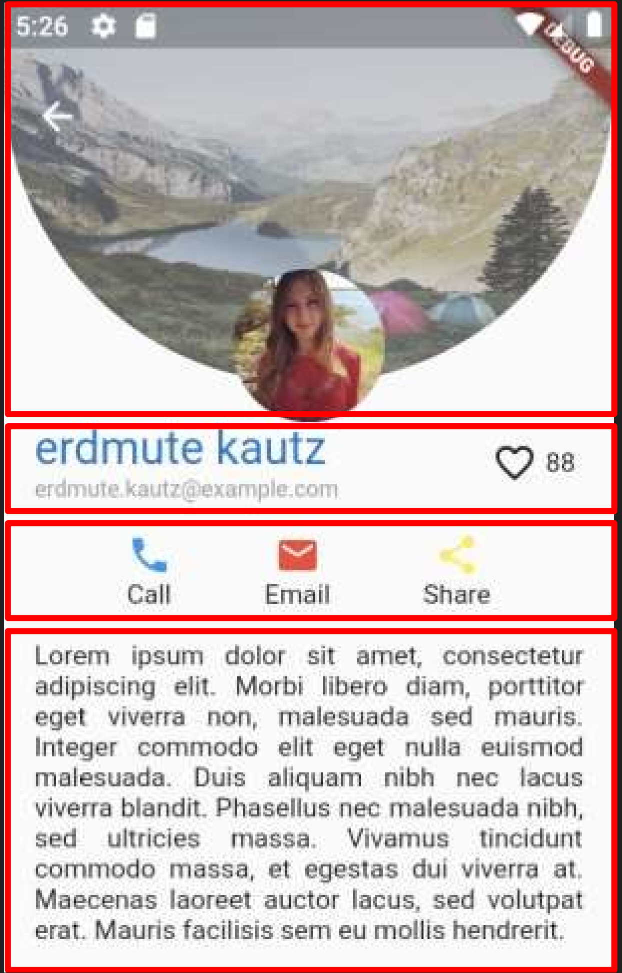
Demo - Building Layouts

Diagram the Layout



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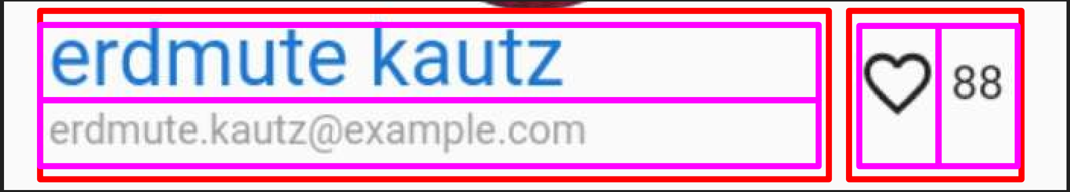
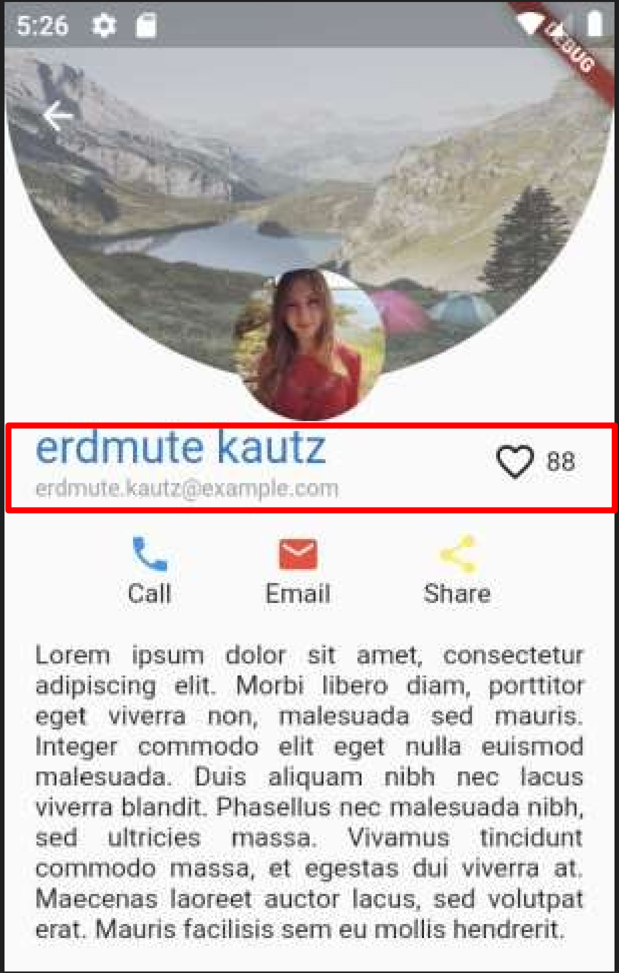
Demo - Building Layouts

Title Section



Further diagram the layout by dividing the section into Columns and Rows



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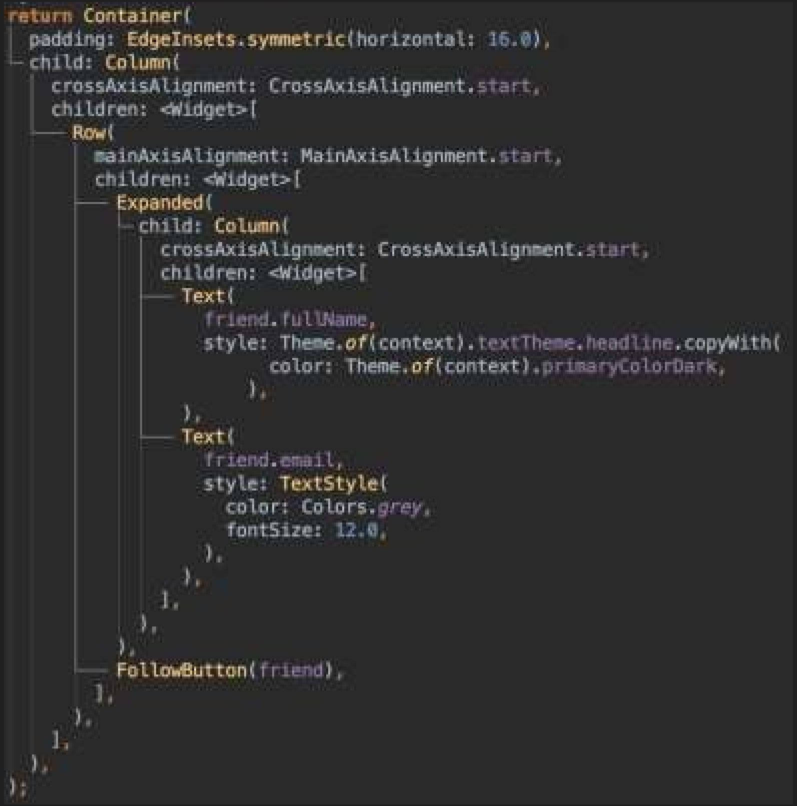
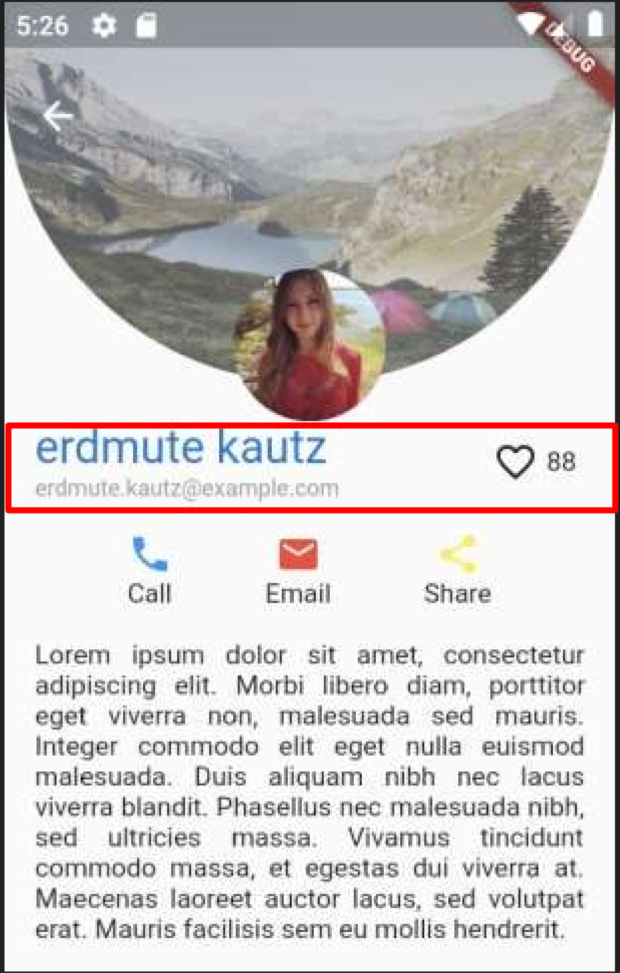
Demo - Building Layouts



```
return Container(
  padding: EdgeInsets.symmetric(horizontal: 16.0),
  child: Column(
    crossAxisAlignment: CrossAxisAlignment.start,
    children: <Widget>[
      Row(
        mainAxisAlignment: MainAxisAlignment.start,
        children: <Widget>[
          Expanded(
            child: Column(
              crossAxisAlignment: CrossAxisAlignment.start,
              children: <Widget>[
                Text(
                  friend.fullName,
                  style: Theme.of(context).textTheme.headline.copyWith(
                        color: Theme.of(context).primaryColorDark,
                      ),
                ),
                Text(
                  friend.email,
                  style: TextStyle(
                    color: Colors.grey,
                    fontSize: 12.0,
                  ),
                ),
              ],
            ),
          ),
          FollowButton(friend),
        ],
      ),
    ],
  ),
);
```



5:26

erdmute kautz

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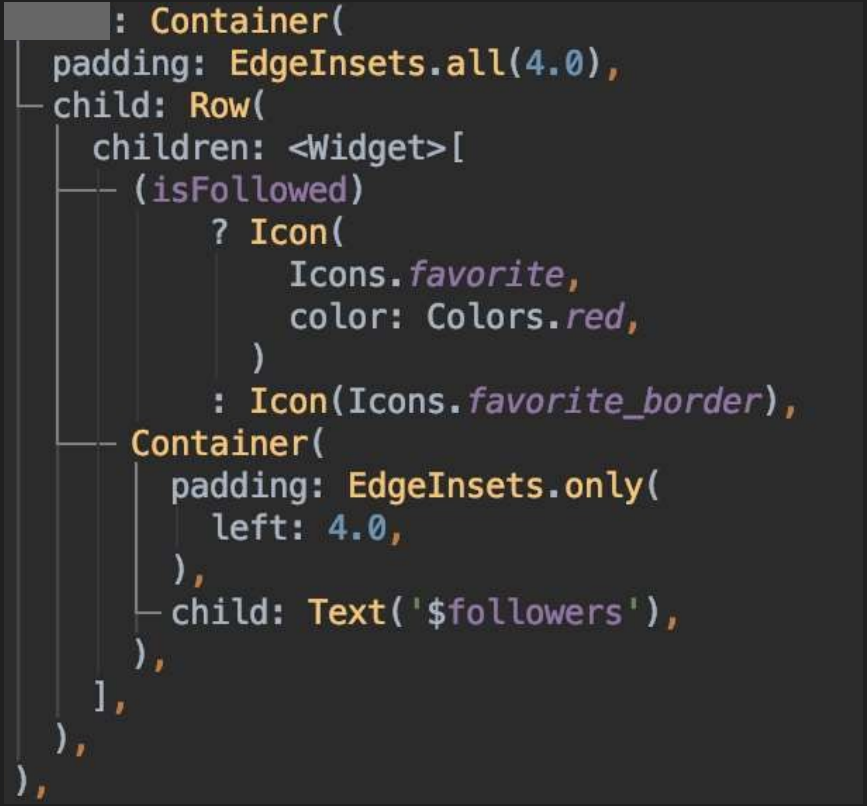
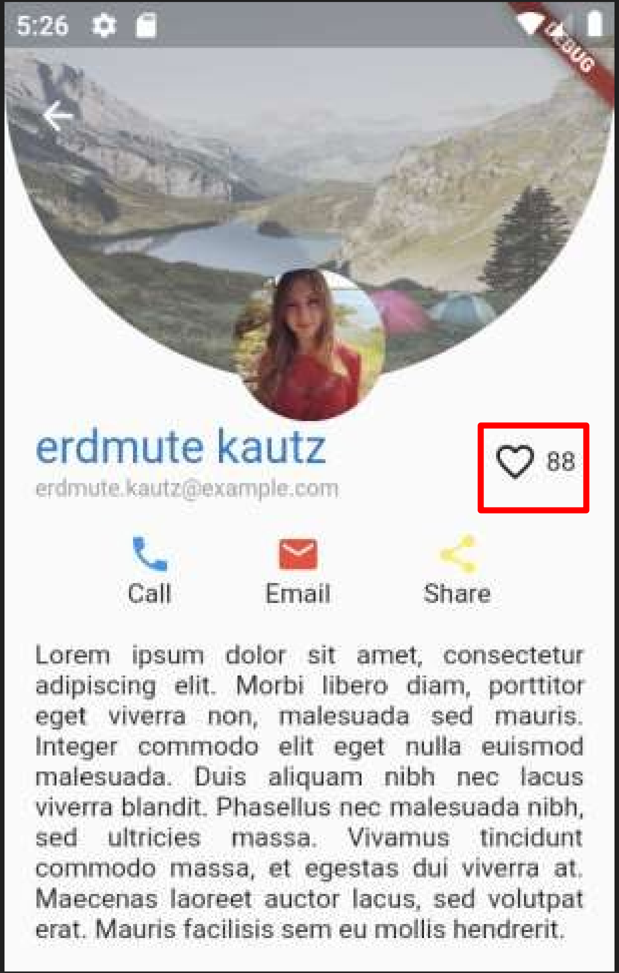
Demo - Building Layouts



```
[redacted]: Container(
  padding: EdgeInsets.all(4.0),
  child: Row(
    children: <Widget>[
      (isFollowed)
          ? Icon(
              Icons.favorite,
              color: Colors.red,
            )
          : Icon(Icons.favorite_border),
      Container(
        padding: EdgeInsets.only(
          left: 4.0,
        ),
        child: Text('$followers'),
      ),
    ],
  ),
),
```



5:26

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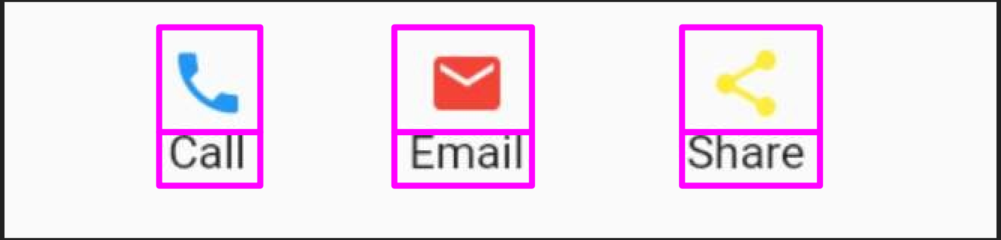
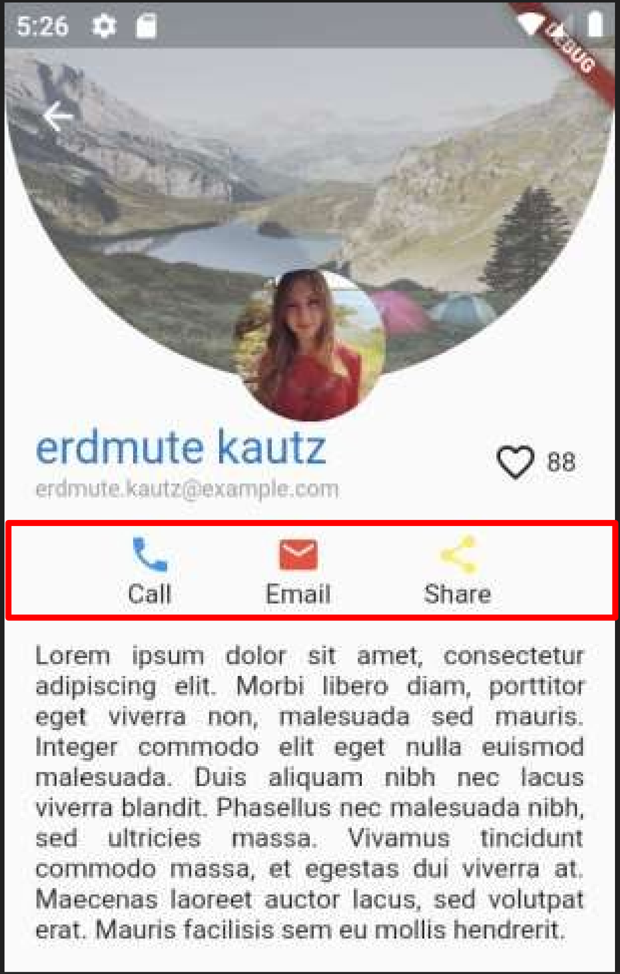
Demo - Building Layouts

Button Section





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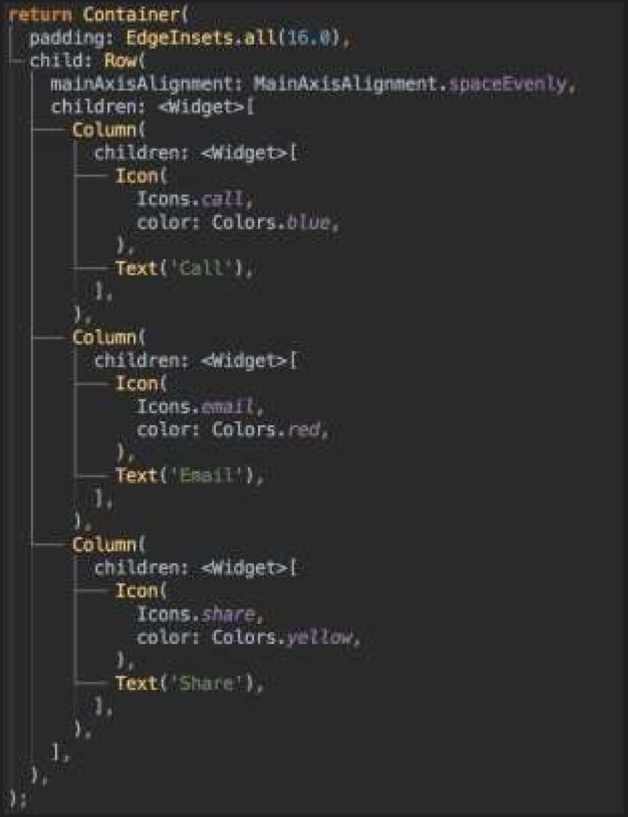
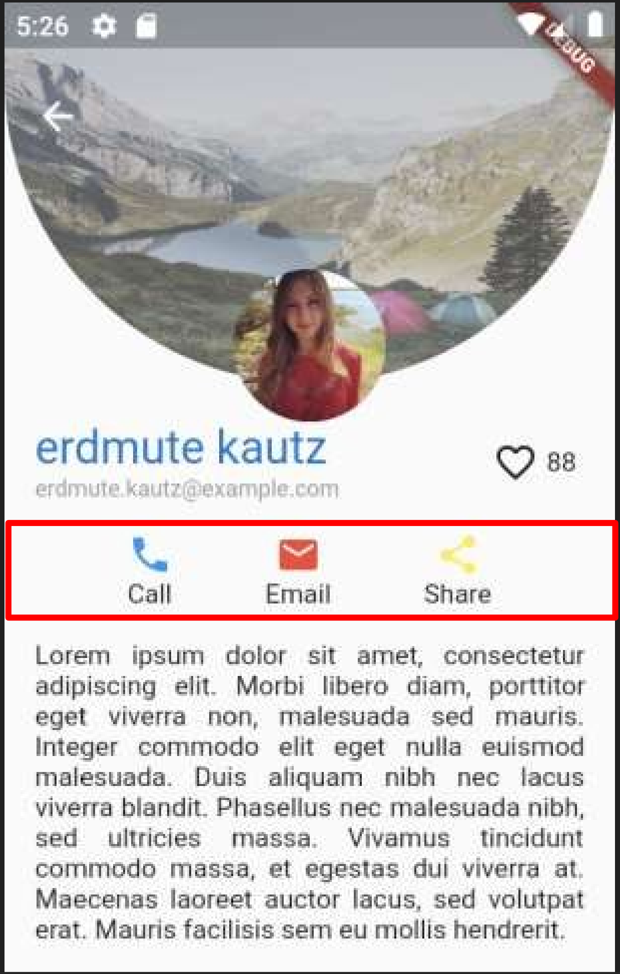
Demo - Building Layouts



```
return Container(
  padding: EdgeInsets.all(16.0),
  child: Row(
    mainAxisAlignment: MainAxisAlignment.spaceEvenly,
    children: <Widget>[
      Column(
        children: <Widget>[
          Icon(
            Icons.call,
            color: Colors.blue,
          ),
          Text('Call'),
        ],
      ),
      Column(
        children: <Widget>[
          Icon(
            Icons.email,
            color: Colors.red,
          ),
          Text('Email'),
        ],
      ),
      Column(
        children: <Widget>[
          Icon(
            Icons.share,
            color: Colors.yellow,
          ),
          Text('Share'),
        ],
      ),
    ],
  ),
);
```



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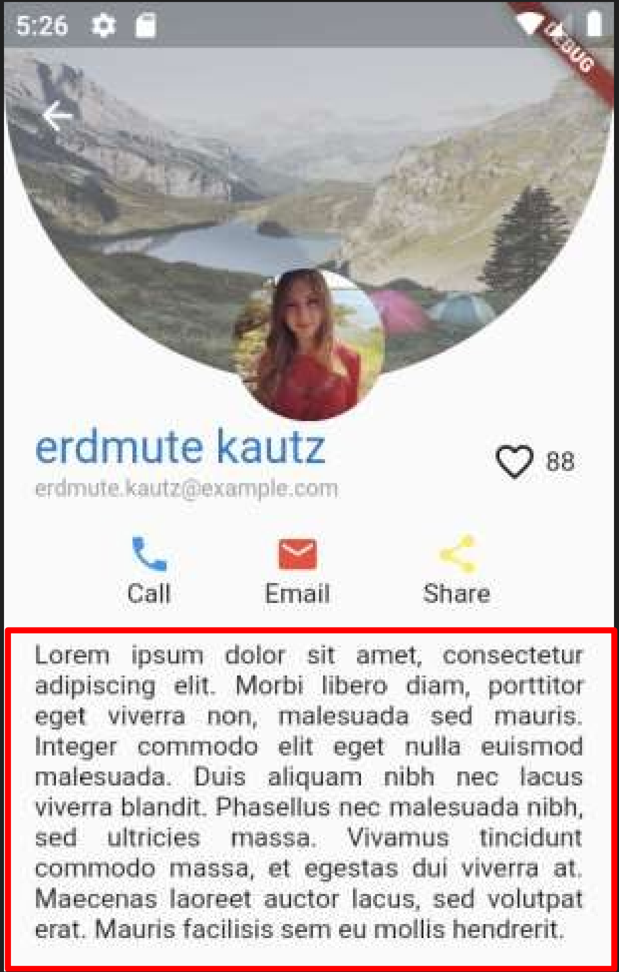
Demo - Building Layouts

Body Section

```
return Container(
  padding: EdgeInsets.symmetric(horizontal: 16.0),
  child: Text(
    'Lorem ipsum dolor sit amet, consectetur adipiscing elit. '
    'Morbi libero diam, porttitor eget viverra non, malesuada sed '
    'mauris. Integer commodo elit eget nulla euismod malesuada. '
    'Duis aliquam nibh nec lacus viverra blandit. Phasellus nec '
    'malesuada nibh, sed ultricies massa. Vivamus tincidunt '
    'commodo massa, et egestas dui viverra at. Maecenas '
    'laoreet auctor lacus, sed volutpat erat. Mauris '
    'facilisis sem eu mollis hendrerit. ',
    softWrap: true,
    textAlign: TextAlign.justify,
  ),
);
```



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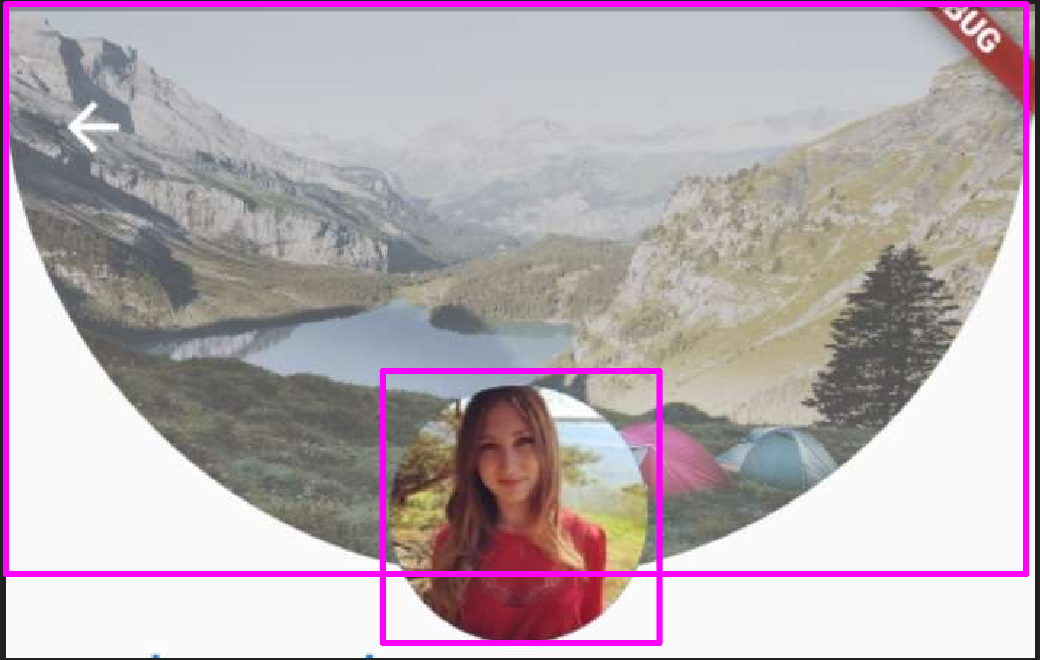
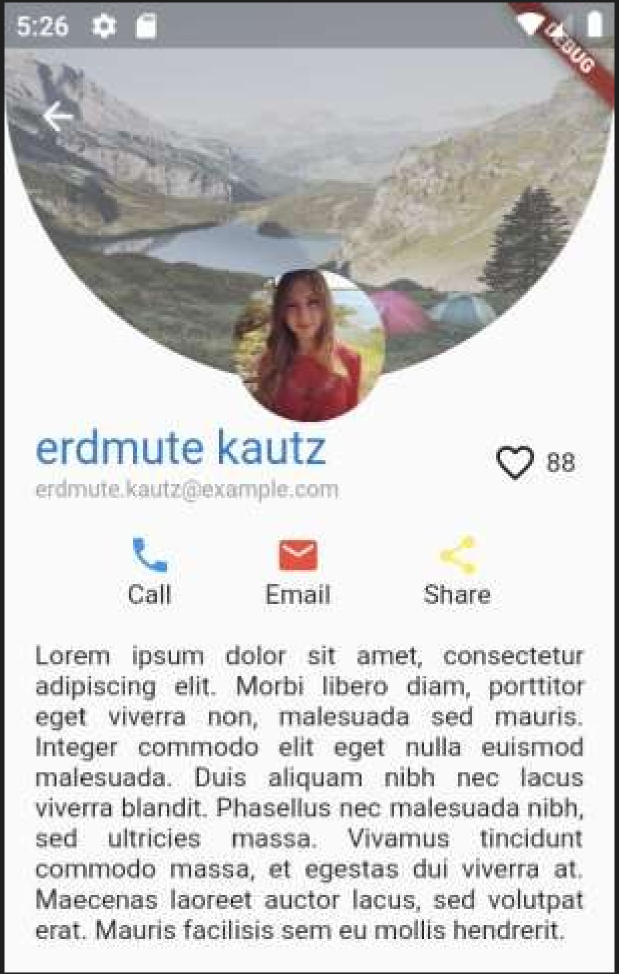
Demo - Building Layouts

- Header Image





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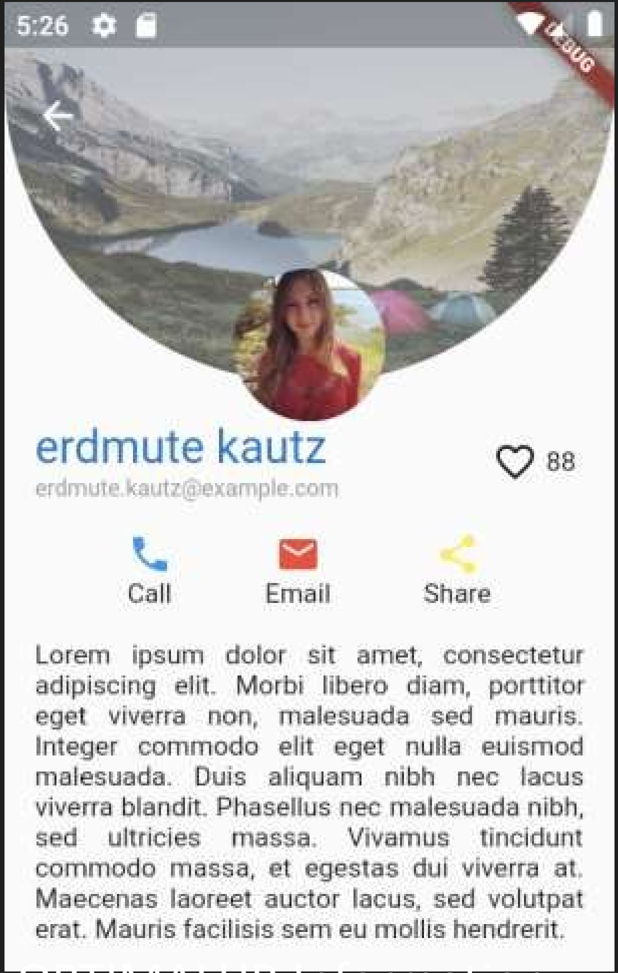
Demo - Building Layouts

- Header Image - Adding Images to your Flutter Project

- Save the images on the assets directory then edit pubspec.yaml

```
assets:
  - assets/lake.jpg
  - assets/avatar.jpg
```



5:26

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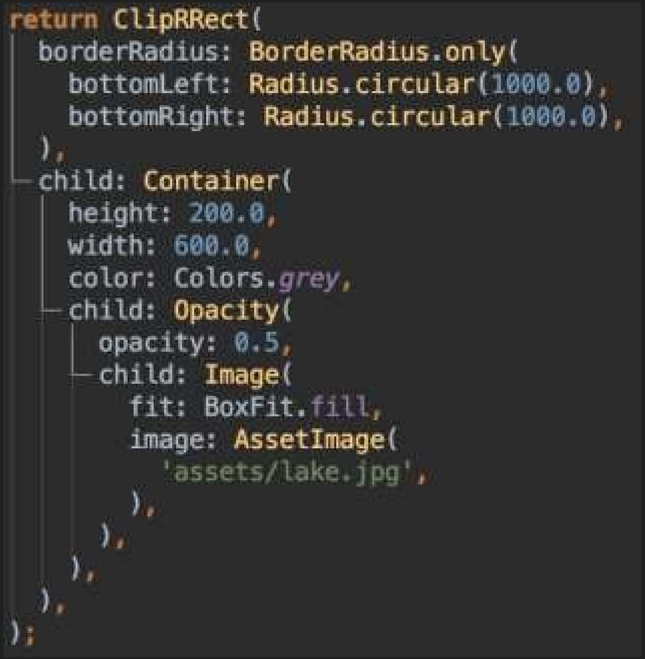
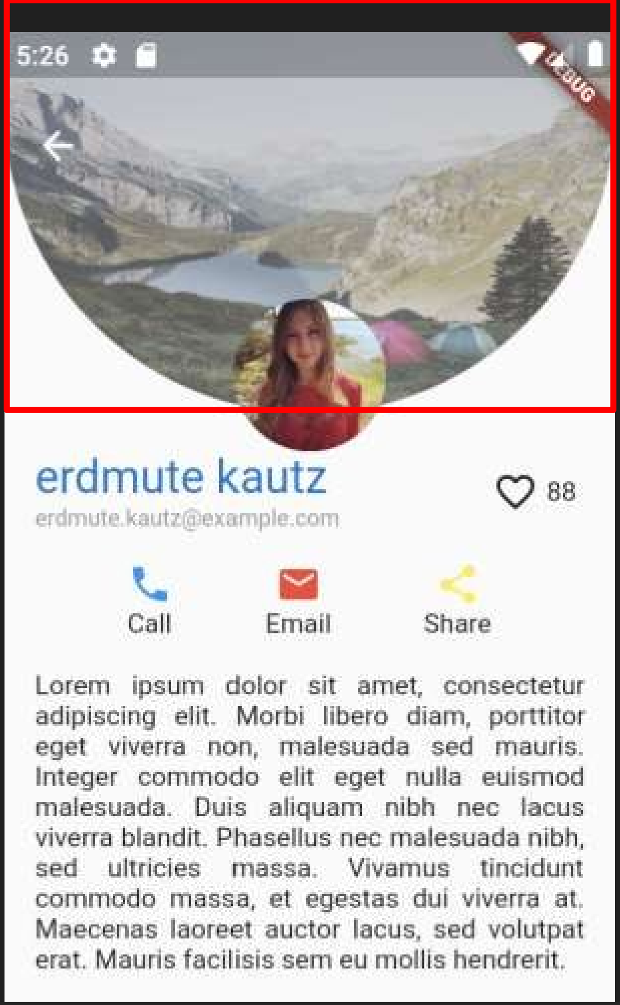
Demo - Building Layouts

- Header Image - Background Image



```
return ClipRRect(
  borderRadius: BorderRadius.only(
    bottomLeft: Radius.circular(1000.0),
    bottomRight: Radius.circular(1000.0),
  ),
  child: Container(
    height: 200.0,
    width: 600.0,
    color: Colors.grey,
    child: Opacity(
      opacity: 0.5,
      child: Image(
        fit: BoxFit.fill,
        image: AssetImage(
          'assets/lake.jpg',
        ),
      ),
    ),
  ),
);
```



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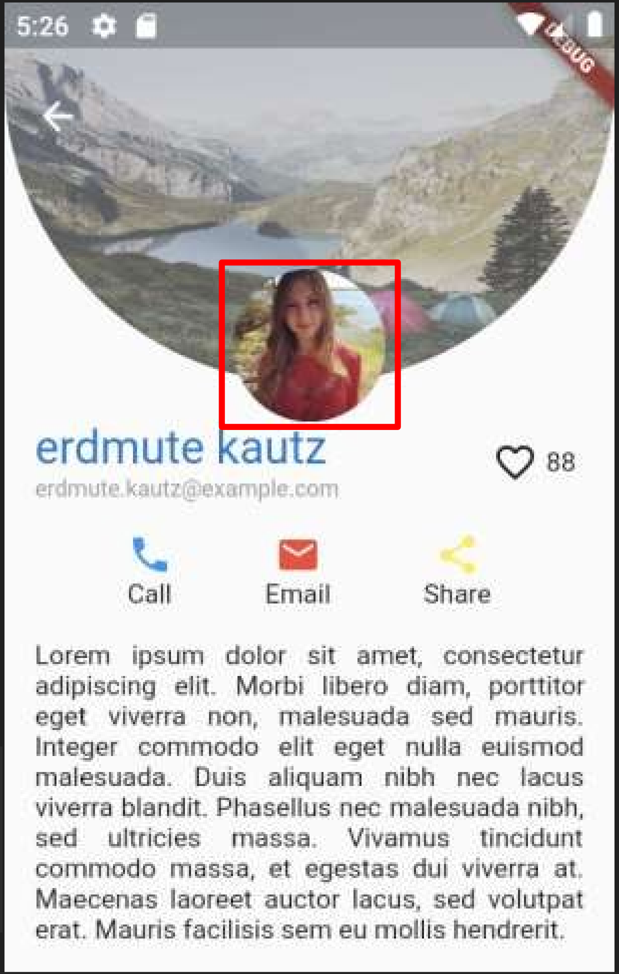
Demo - Building Layouts

- Header Image - Avatar

```
child: CircleAvatar(
  radius: 40.0,
  backgroundImage: AssetImage('assets/avatar.jpg'),
),
```

- Adding Image From a URL:

```
child: CircleAvatar(
  radius: 40.0,
  backgroundImage:
  NetworkImage('https://randomuser.me/api/portraits/women/12.jpg'),
),
```



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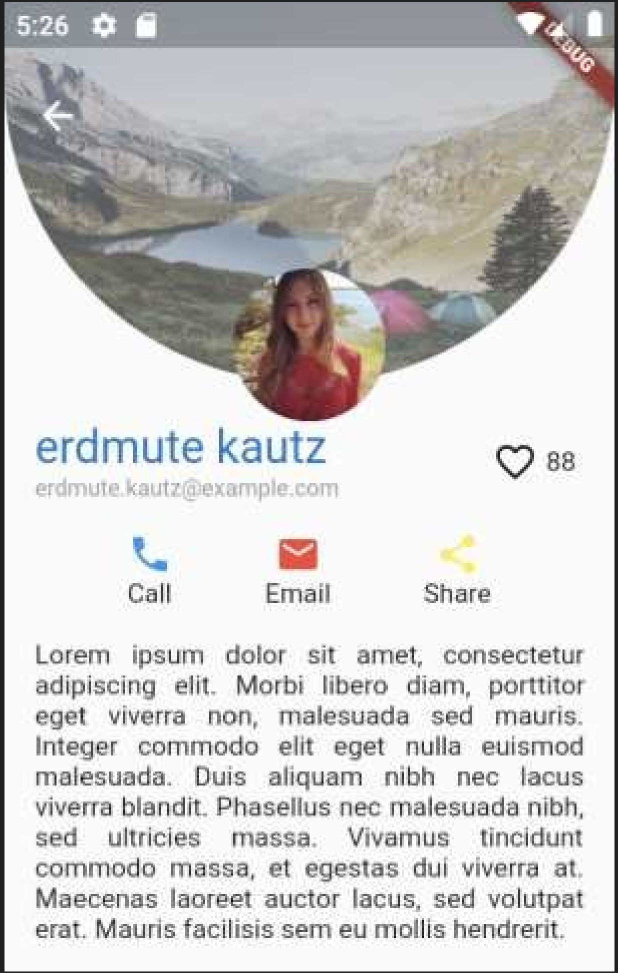
Demo - Building Layouts

- Header Image - Stack Widget

```
return Container(
  height: 220.0,
  child: Stack(
    children: <Widget>[
      TopImage(),
      Avatar(friend),
      [redacted]
    ],
  ),
);
```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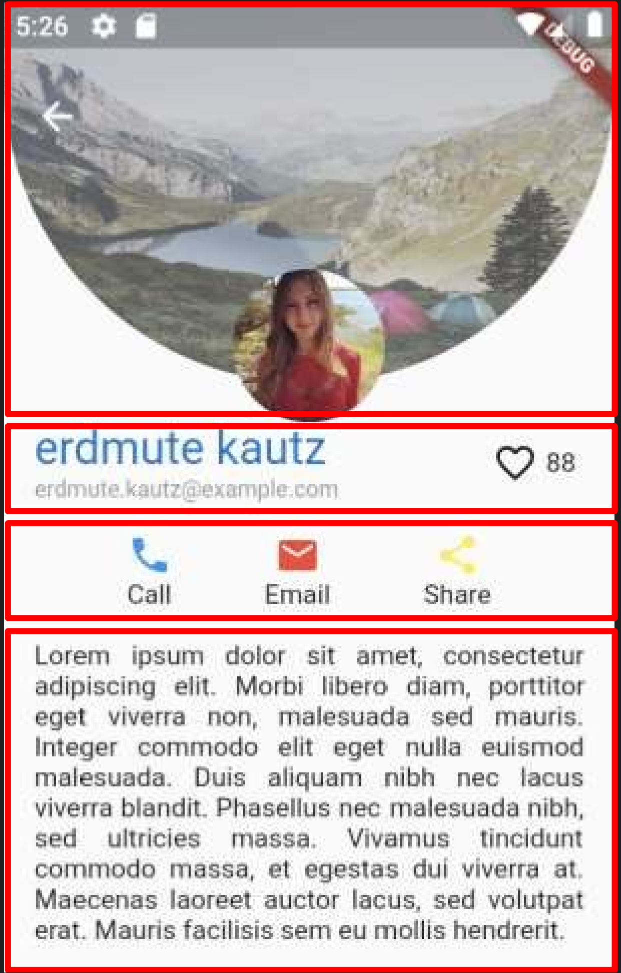
Demo - Building Layouts

Put them all together

```
return Scaffold(
└ body: Column(
    crossAxisAlignment: CrossAxisAlignment.start,
    children: <Widget>[
    ── FriendHeader(friend),
    ── FriendTitle(friend),
    ── FriendButtons(),
    ── FriendBody(friend),
    ],
  ),
);
```



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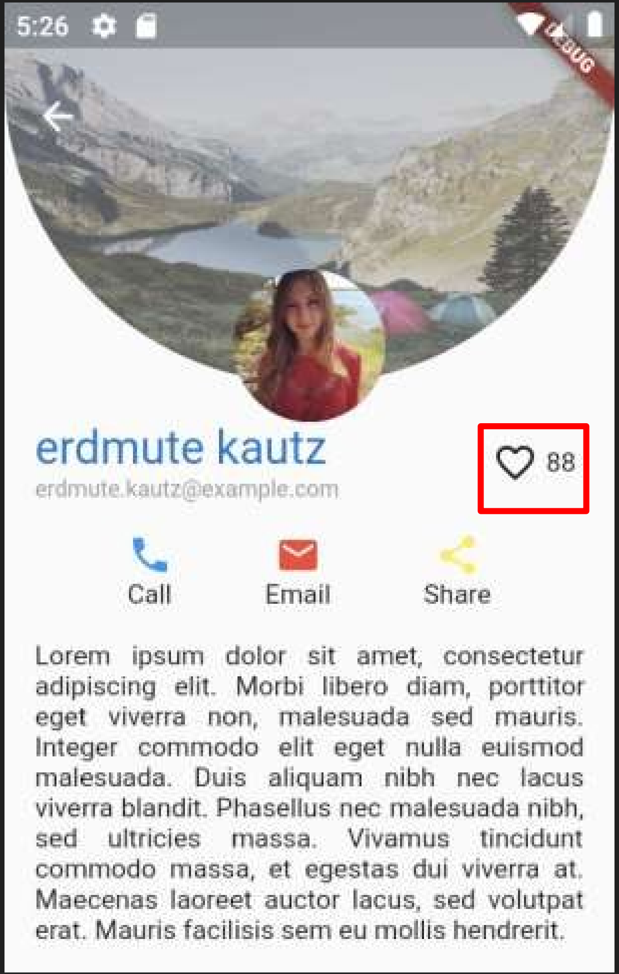
Adding Interactivity

Adding Interactivity

- Adding simple interactivity to the favorite button



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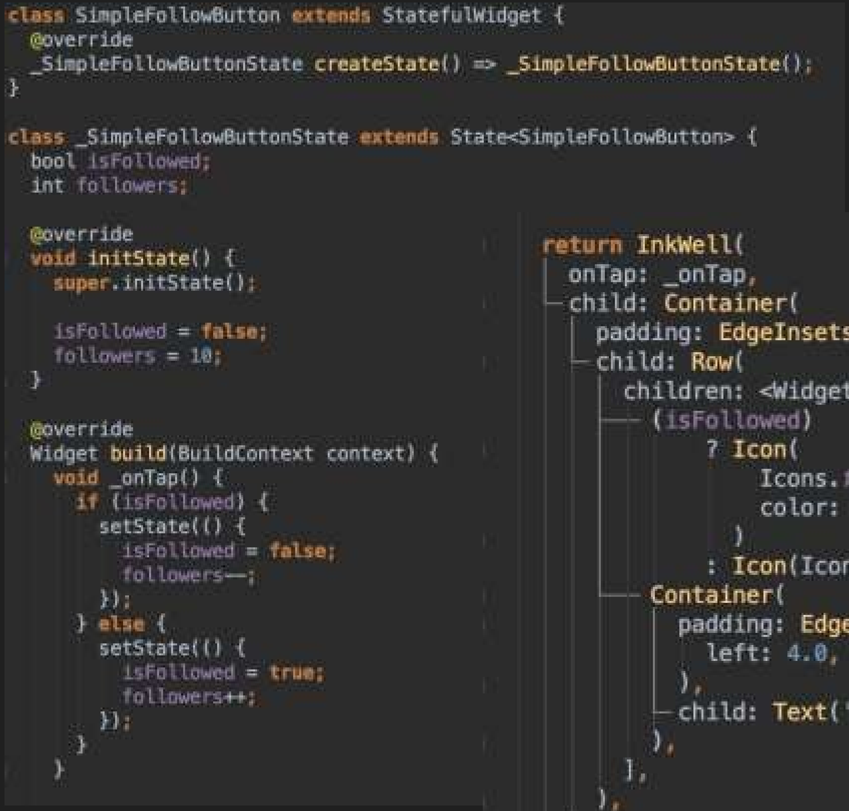
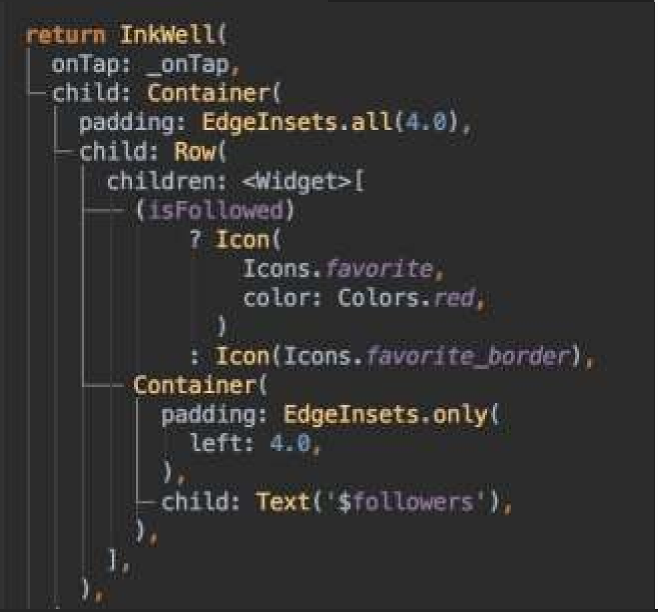
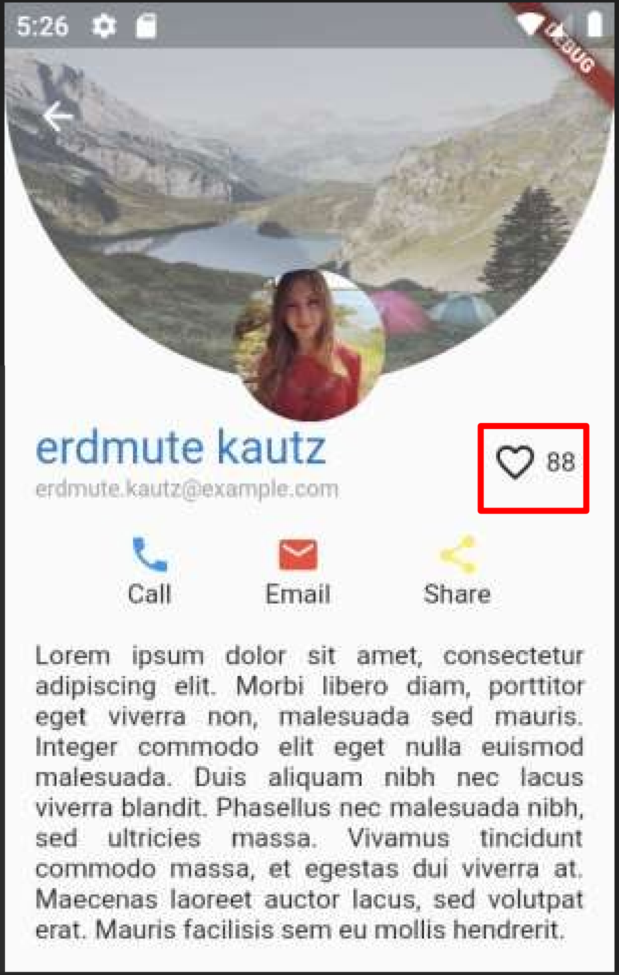
Adding Interactivity



```
class SimpleFollowButton extends StatefulWidget {
  @override
  _SimpleFollowButtonState createState() => _SimpleFollowButtonState();
}

class _SimpleFollowButtonState extends State<SimpleFollowButton> {
  bool isFollowed;
  int followers;

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

    isFollowed = false;
    followers = 10;
  }

  @override
  Widget build(BuildContext context) {
    void _onTap() {
      if (isFollowed) {
        setState(() {
          isFollowed = false;
          followers--;
        });
      } else {
        setState(() {
          isFollowed = true;
          followers++;
        });
      }
    }
```



```
return InkWell(
  onTap: _onTap,
  child: Container(
    padding: EdgeInsets.all(4.0),
    child: Row(
      children: <Widget>[
        (isFollowed)
            ? Icon(
                Icons.favorite,
                color: Colors.red,
              )
            : Icon(Icons.favorite_border),
        Container(
          padding: EdgeInsets.only(
            left: 4.0,
          ),
          child: Text('$followers'),
        ),
      ],
    ),
```



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Resources

- Flutter Widgets Catalog
  https://flutter.dev/docs/development/ui/widgets
- Dart Language Tour
  https://dart.dev/guides/language/language-tour
- Effective Dart
  https://dart.dev/guides/language/effective-dart