Understanding constraints

https://docs.flutter.dev/
https://docs.flutter.dev/development/ui/layout/constraints

1. Development
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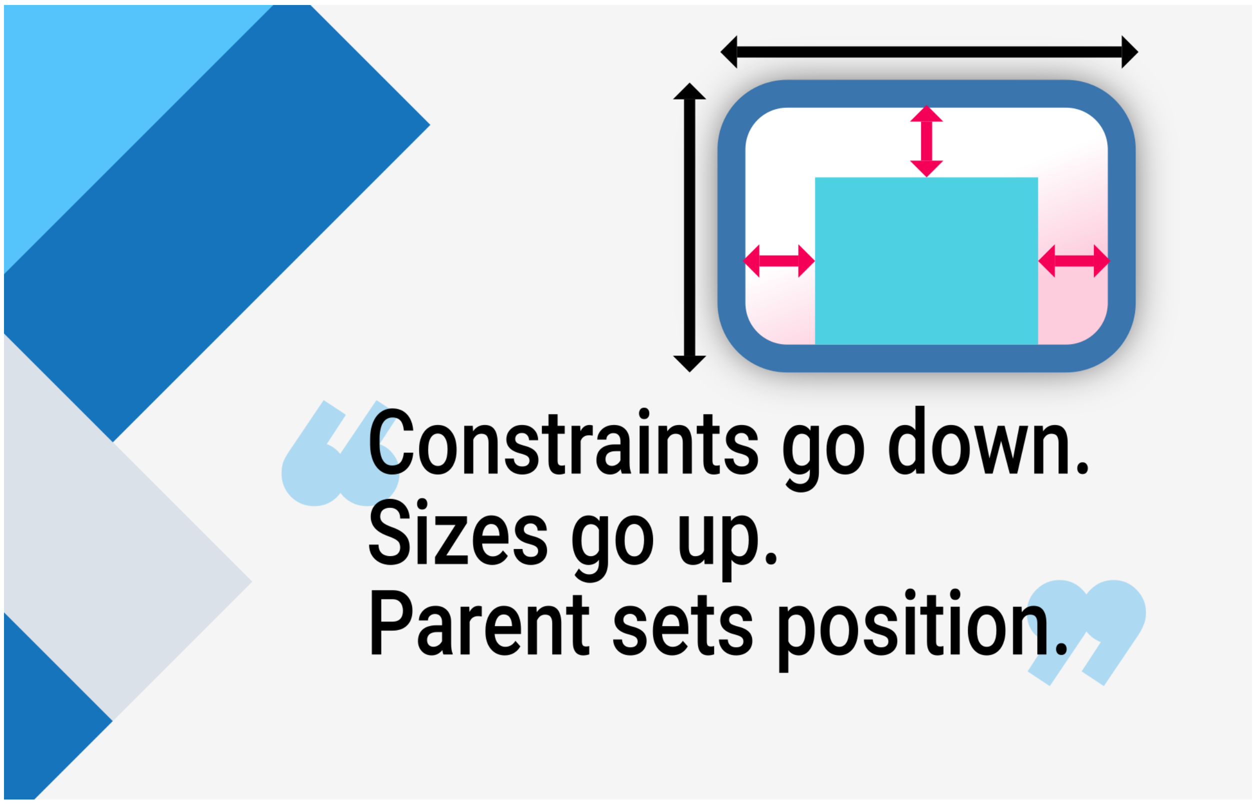
4. Understanding constraints



When someone learning Flutter asks you why some widget with `width:100` isn't 100 pixels wide, the default answer is to tell them to put that widget inside of a `Center`, right?

Don't do that.

If you do, they'll come back again and again, asking why some `FittedBox` isn't working, why that `Column` is overflowing, or what `IntrinsicWidth` is supposed to be doing.

Instead, first tell them that Flutter layout is very different from HTML layout (which is probably where they're coming from), and then make them memorize the following rule:

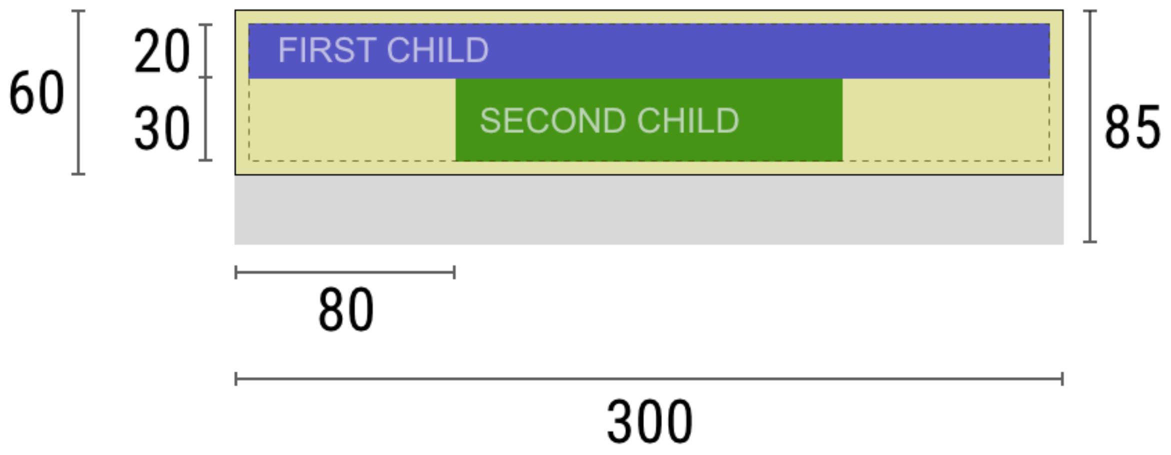
Constraints go down. Sizes go up. Parent sets position.

Flutter layout can't really be understood without knowing this rule, so Flutter developers should learn it early on.

In more detail:

- A widget gets its own constraints from its parent. A *constraint* is just a set of 4 doubles: a minimum and maximum width, and a minimum and maximum height.
- Then the widget goes through its own list of children. One by one, the widget tells its children what their constraints are (which can be different for each child), and then asks each child what size it wants to be.
- Then, the widget positions its children (horizontally in the `x` axis, and vertically in the `y` axis), one by one.
- And, finally, the widget tells its parent about its own size (within the original constraints, of course).

For example, if a composed widget contains a column with some padding, and wants to lay out its two children as follows:



The negotiation goes something like this:

Widget: "Hey parent, what are my constraints?"

Parent: "You must be from `80` to `300` pixels wide, and `30` to `85` tall."

Widget: "Hmmm, since I want to have `5` pixels of padding, then my children can have at most `290` pixels of width and `75` pixels of height."

Widget: “Hey first child, You must be from `0` to `290` pixels wide, and `0` to `75` tall.”

First child: “OK, then I wish to be `290` pixels wide, and `20` pixels tall.”

Widget: “Hmmm, since I want to put my second child below the first one, this leaves only `55` pixels of height for my second child.”

Widget: “Hey second child, You must be from `0` to `290` wide, and `0` to `55` tall.”

Second child: “OK, I wish to be `140` pixels wide, and `30` pixels tall.”

Widget: “Very well. My first child has position `x: 5` and `y: 5`, and my second child has `x: 80` and `y: 25`.”

Widget: “Hey parent, I’ve decided that my size is going to be `300` pixels wide, and `60` pixels tall.”

Limitations

As a result of the layout rule mentioned above, Flutter’s layout engine has a few important limitations:

- A widget can decide its own size only within the constraints given to it by its parent. This means a widget usually can’t have any size it wants.
- A widget can’t know and doesn’t decide its own position in the screen, since it’s the widget’s parent who decides the position of the widget.
- Since the parent’s size and position, in its turn, also depends on its own parent, it’s impossible to precisely define the size and position of any widget without taking into consideration the tree as a whole.
- If a child wants a different size from its parent and the parent doesn’t have enough information to align it, then the child’s size might be ignored. Be specific when defining alignment.

Examples

For an interactive experience, use the following DartPad. Use the numbered horizontal scrolling bar to switch between 29 different examples.

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

void main() => runApp(const HomePage());
```

```dart
const red = Colors.red;
const green = Colors.green;
const blue = Colors.blue;
const big = TextStyle(fontSize: 30);

//////////////////////////////////////////////////

class HomePage extends StatelessWidget {
  const HomePage({Key? key}) : super(key: key);

  @override
  Widget build(BuildContext context) {
    return const FlutterLayoutArticle([
      Example1(),
      Example2(),
      Example3(),
      Example4(),
      Example5(),
      Example6(),
      Example7(),
      Example8(),
      Example9(),
      Example10(),
      Example11(),
      Example12(),
      Example13(),
      Example14(),
      Example15(),
      Example16(),
      Example17(),
      Example18(),
      Example19(),
      Example20(),
      Example21(),
      Example22(),
      Example23(),
      Example24(),
      Example25(),
      Example26(),
      Example27(),
      Example28(),
      Example29(),
    ]);
  }
}

//////////////////////////////////////////////////

abstract class Example extends StatelessWidget {
  const Example({Key? key}) : super(key: key);

  String get code;

  String get explanation;
}

//////////////////////////////////////////////////

class FlutterLayoutArticle extends StatefulWidget {
  const FlutterLayoutArticle(
    this.examples, {
    Key? key,
  }) : super(key: key);

  final List<Example> examples;

  @override
  _FlutterLayoutArticleState createState() => _FlutterLayoutArticleState();
}

//////////////////////////////////////////////////

class _FlutterLayoutArticleState extends State<FlutterLayoutArticle> {
  late int count;
  late Widget example;
  late String code;
  late String explanation;

  @override
  void initState() {
    count = 1;
    code = const Example1().code;
    explanation = const Example1().explanation;

    super.initState();
  }

  @override
  void didUpdateWidget(FlutterLayoutArticle oldWidget) {
    super.didUpdateWidget(oldWidget);
    var example = widget.examples[count - 1];
    code = example.code;
    explanation = example.explanation;
  }

  @override
  Widget build(BuildContext context) {
    return MaterialApp(
      debugShowCheckedModeBanner: false,
      title: 'Flutter Layout Article',
      home: SafeArea(
        child: Material(
          color: Colors.black,
          child: FittedBox(
            child: Container(
              width: 400,
              height: 670,
              color: const Color(0xFFCCCCCC),
              child: Column(
                crossAxisAlignment: CrossAxisAlignment.center,
                children: [
                  Expanded(
                      child: ConstrainedBox(
                          constraints: const BoxConstraints.tightFor(
                              width: double.infinity, height:
double.infinity),
                          child: widget.examples[count - 1])),
                  Container(
                    height: 50,
                    width: double.infinity,
                    color: Colors.black,
                    child: SingleChildScrollView(
                      scrollDirection: Axis.horizontal,
                      child: Row(
                        mainAxisSize: MainAxisSize.min,
                        children: [
                          for (int i = 0; i < widget.examples.length; i++)
                            Container(
                              width: 58,
                              padding:
                                  const EdgeInsets.only(left: 4.0, right:
4.0),
                              child: button(i + 1),
                            ),
                        ],
                      ),
                    ),
                  ),
                  Container(
                    child: Scrollbar(
                      child: SingleChildScrollView(
                        key: ValueKey(count),
                        child: Padding(
                          padding: const EdgeInsets.all(10.0),
                          child: Column(
                            children: [
                              Center(child: Text(code)),
                              const SizedBox(height: 15),
                              Text(
                                explanation,
                                style: TextStyle(
                                    color: Colors.blue[900],
                                    fontStyle: FontStyle.italic),
                              ),
                            ],
                          ),
                        ),
                      ),
                    ),
                    height: 273,
                    color: Colors.grey[50],
                  ),
                ],
              ),
            ),
          ),
        ),
      ),
    );
  }
  Widget button(int exampleNumber) {
    return Button(
      key: ValueKey('button$exampleNumber'),
      isSelected: count == exampleNumber,
      exampleNumber: exampleNumber,
      onPressed: () {
        showExample(
          exampleNumber,
          widget.examples[exampleNumber - 1].code,
          widget.examples[exampleNumber - 1].explanation,
        );
      },
    );
  }

  void showExample(int exampleNumber, String code, String explanation) {
    setState(() {
      count = exampleNumber;
      this.code = code;
      this.explanation = explanation;
    });
  }
}

//////////////////////////////////////////////////

class Button extends StatelessWidget {
  final bool isSelected;
  final int exampleNumber;
  final VoidCallback onPressed;

  const Button({
    required Key key,
    required this.isSelected,
    required this.exampleNumber,
    required this.onPressed,
  }) : super(key: key);

  @override
  Widget build(BuildContext context) {
    return TextButton(
      style: TextButton.styleFrom(
        primary: Colors.white,
```

```dart
        backgroundColor: isSelected ? Colors.grey : Colors.grey[800],
      ),
      child: Text(exampleNumber.toString()),
      onPressed: () {
        Scrollable.ensureVisible(
          context,
          duration: const Duration(milliseconds: 350),
          curve: Curves.easeOut,
          alignment: 0.5,
        );
        onPressed();
      },
    );
  }
}
//////////////////////////////////////////////////

class Example1 extends Example {
  const Example1({Key? key}) : super(key: key);

  @override
  final code = 'Container(color: red)';

  @override
  final explanation = 'The screen is the parent of the Container, '
      'and it forces the Container to be exactly the same size as the
screen.'
      '\n\n'
      'So the Container fills the screen and paints it red.';

  @override
  Widget build(BuildContext context) {
    return Container(color: red);
  }
}

//////////////////////////////////////////////////

class Example2 extends Example {
  const Example2({Key? key}) : super(key: key);

  @override
  final code = 'Container(width: 100, height: 100, color: red)';
  @override
  final String explanation =
      'The red Container wants to be 100x100, but it can\'t, '
      'because the screen forces it to be exactly the same size as the
screen.'
      '\n\n'
      'So the Container fills the screen.';

  @override
  Widget build(BuildContext context) {
    return Container(width: 100, height: 100, color: red);
  }
}

//////////////////////////////////////////////////

class Example3 extends Example {
  const Example3({Key? key}) : super(key: key);

  @override
  final code = 'Center(\n'
      '   child: Container(width: 100, height: 100, color: red))';
  @override
  final String explanation =
      'The screen forces the Center to be exactly the same size as the
screen,'
      'so the Center fills the screen.'
      '\n\n'
      'The Center tells the Container that it can be any size it wants, but
not bigger than the screen.'
      'Now the Container can indeed be 100x100.';

  @override
  Widget build(BuildContext context) {
    return Center(
      child: Container(width: 100, height: 100, color: red),
    );
  }
}

//////////////////////////////////////////////////

class Example4 extends Example {
  const Example4({Key? key}) : super(key: key);

  @override
  final code = 'Align(\n'
      '   alignment: Alignment.bottomRight,\n'
      '   child: Container(width: 100, height: 100, color: red))';
  @override
  final String explanation =
      'This is different from the previous example in that it uses Align
instead of Center.'
      '\n\n'
      'Align also tells the Container that it can be any size it wants, but
if there is empty space it won\'t center the Container. '
      'Instead, it aligns the Container to the bottom-right of the
available space.';

  @override
  Widget build(BuildContext context) {
    return Align(
      alignment: Alignment.bottomRight,
      child: Container(width: 100, height: 100, color: red),
    );
  }
}

//////////////////////////////////////////////////

class Example5 extends Example {
  const Example5({Key? key}) : super(key: key);

  @override
  final code = 'Center(\n'
      '   child: Container(\n'
      '              color: red,\n'
      '              width: double.infinity,\n'
      '              height: double.infinity))';
  @override
  final String explanation =
      'The screen forces the Center to be exactly the same size as the
screen,'
      'so the Center fills the screen.'
      '\n\n'
      'The Center tells the Container that it can be any size it wants, but
```

```
not bigger than the screen.'
      'The Container wants to be of infinite size, but since it can\'t be
bigger than the screen, it just fills the screen.';

  @override
  Widget build(BuildContext context) {
    return Center(
      child: Container(
          width: double.infinity, height: double.infinity, color: red),
    );
  }
}

//////////////////////////////////////////////////

class Example6 extends Example {
  const Example6({Key? key}) : super(key: key);

  @override
  final code = 'Center(child: Container(color: red))';
  @override
  final String explanation =
      'The screen forces the Center to be exactly the same size as the
screen,'
      'so the Center fills the screen.'
      '\n\n'
      'The Center tells the Container that it can be any size it wants, but
not bigger than the screen.'
      '\n\n'
      'Since the Container has no child and no fixed size, it decides it
wants to be as big as possible, so it fills the whole screen.'
      '\n\n'
      'But why does the Container decide that? '
      'Simply because that\'s a design decision by those who created the
Container widget. '
      'It could have been created differently, and you have to read the
Container documentation to understand how it behaves, depending on the
circumstances. ';

  @override
  Widget build(BuildContext context) {
    return Center(
      child: Container(color: red),
    );
  }
}

//////////////////////////////////////////////////

class Example7 extends Example {
  const Example7({Key? key}) : super(key: key);

  @override
  final code = 'Center(\n'
      '   child: Container(color: red\n'
      '      child: Container(color: green, width: 30, height: 30)))';
  @override
  final String explanation =
      'The screen forces the Center to be exactly the same size as the
screen,'
      'so the Center fills the screen.'
      '\n\n'
      'The Center tells the red Container that it can be any size it wants,
but not bigger than the screen.'
      'Since the red Container has no size but has a child, it decides it
wants to be the same size as its child.'
      '\n\n'
      'The red Container tells its child that it can be any size it wants,
but not bigger than the screen.'
      '\n\n'
      'The child is a green Container that wants to be 30x30.'
      '\n\n'
      'Since the red `Container` has no size but has a child, it decides it
wants to be the same size as its child. '
      'The red color isn\'t visible, since the green Container entirely
covers all of the red Container.';

  @override
  Widget build(BuildContext context) {
    return Center(
      child: Container(
        color: red,
        child: Container(color: green, width: 30, height: 30),
      ),
    );
  }
```

```
}

//////////////////////////////////////////////////

class Example8 extends Example {
  const Example8({Key? key}) : super(key: key);

  @override
  final code = 'Center(\n'
      '   child: Container(color: red\n'
      '      padding: const EdgeInsets.all(20.0),\n'
      '      child: Container(color: green, width: 30, height: 30)))';
  @override
  final String explanation =
      'The red Container sizes itself to its children size, but it takes
its own padding into consideration. '
      'So it is also 30x30 plus padding. '
      'The red color is visible because of the padding, and the green
Container has the same size as in the previous example.';

  @override
  Widget build(BuildContext context) {
    return Center(
      child: Container(
        padding: const EdgeInsets.all(20.0),
        color: red,
        child: Container(color: green, width: 30, height: 30),
      ),
    );
  }
}

//////////////////////////////////////////////////

class Example9 extends Example {
  const Example9({Key? key}) : super(key: key);

  @override
  final code = 'ConstrainedBox(\n'
      '   constraints: BoxConstraints(\n'
      '              minWidth: 70, minHeight: 70,\n'
      '              maxWidth: 150, maxHeight: 150),\n'
      '      child: Container(color: red, width: 10, height: 10)))';
  @override
  final String explanation =
      'You might guess that the Container has to be between 70 and 150
pixels, but you would be wrong. '
      'The ConstrainedBox only imposes ADDITIONAL constraints from those it
receives from its parent.'
      '\n\n'
      'Here, the screen forces the ConstrainedBox to be exactly the same
size as the screen, '
      'so it tells its child Container to also assume the size of the
screen, '
      'thus ignoring its \'constraints\' parameter.';

  @override
  Widget build(BuildContext context) {
    return ConstrainedBox(
      constraints: const BoxConstraints(
        minWidth: 70,
        minHeight: 70,
        maxWidth: 150,
        maxHeight: 150,
      ),
      child: Container(color: red, width: 10, height: 10),
    );
  }
}

//////////////////////////////////////////////////

class Example10 extends Example {
  const Example10({Key? key}) : super(key: key);

  @override
  final code = 'Center(\n'
      '   child: ConstrainedBox(\n'
      '      constraints: BoxConstraints(\n'
      '                 minWidth: 70, minHeight: 70,\n'
      '                 maxWidth: 150, maxHeight: 150),\n'
      '        child: Container(color: red, width: 10, height: 10))))';
  @override
  final String explanation =
      'Now, Center allows ConstrainedBox to be any size up to the screen
size.'
```

```
      '\n\n'
      'The ConstrainedBox imposes ADDITIONAL constraints from its
\'constraints\' parameter onto its child.'
      '\n\n'
      'The Container must be between 70 and 150 pixels. It wants to have 10
pixels, so it will end up having 70 (the MINIMUM).';

  @override
  Widget build(BuildContext context) {
    return Center(
      child: ConstrainedBox(
        constraints: const BoxConstraints(
          minWidth: 70,
          minHeight: 70,
          maxWidth: 150,
          maxHeight: 150,
        ),
        child: Container(color: red, width: 10, height: 10),
      ),
    );
  }
}

//////////////////////////////////////////////////

class Example11 extends Example {
  const Example11({Key? key}) : super(key: key);

  @override
  final code = 'Center(\n'
      '   child: ConstrainedBox(\n'
      '      constraints: BoxConstraints(\n'
      '                 minWidth: 70, minHeight: 70,\n'
      '                 maxWidth: 150, maxHeight: 150),\n'
      '        child: Container(color: red, width: 1000, height: 1000)))';
  @override
  final String explanation =
      'Center allows ConstrainedBox to be any size up to the screen size.'
      'The ConstrainedBox imposes ADDITIONAL constraints from its
\'constraints\' parameter onto its child'
      '\n\n'
      'The Container must be between 70 and 150 pixels. It wants to have
1000 pixels, so it ends up having 150 (the MAXIMUM).';
```

```
  @override
  Widget build(BuildContext context) {
    return Center(
      child: ConstrainedBox(
        constraints: const BoxConstraints(
          minWidth: 70,
          minHeight: 70,
          maxWidth: 150,
          maxHeight: 150,
        ),
        child: Container(color: red, width: 1000, height: 1000),
      ),
    );
  }
}

//////////////////////////////////////////////////

class Example12 extends Example {
  const Example12({Key? key}) : super(key: key);

  @override
  final code = 'Center(\n'
      '   child: ConstrainedBox(\n'
      '      constraints: BoxConstraints(\n'
      '                 minWidth: 70, minHeight: 70,\n'
      '                 maxWidth: 150, maxHeight: 150),\n'
      '        child: Container(color: red, width: 100, height: 100)))';
  @override
  final String explanation =
      'Center allows ConstrainedBox to be any size up to the screen size.'
      'ConstrainedBox imposes ADDITIONAL constraints from its
\'constraints\' parameter onto its child.'
      '\n\n'
      'The Container must be between 70 and 150 pixels. It wants to have
100 pixels, and that\'s the size it has, since that\'s between 70 and
150.';

  @override
  Widget build(BuildContext context) {
    return Center(
      child: ConstrainedBox(
```

```dart
        constraints: const BoxConstraints(
          minWidth: 70,
          minHeight: 70,
          maxWidth: 150,
          maxHeight: 150,
        ),
        child: Container(color: red, width: 100, height: 100),
      ),
    );
  }
}

//////////////////////////////////////////////////

class Example13 extends Example {
  const Example13({Key? key}) : super(key: key);

  @override
  final code = 'UnconstrainedBox(\n'
      '   child: Container(color: red, width: 20, height: 50));';
  @override
  final String explanation =
      'The screen forces the UnconstrainedBox to be exactly the same size
as the screen.'
      'However, the UnconstrainedBox lets its child Container be any size
it wants.';

  @override
  Widget build(BuildContext context) {
    return UnconstrainedBox(
      child: Container(color: red, width: 20, height: 50),
    );
  }
}

//////////////////////////////////////////////////

class Example14 extends Example {
  const Example14({Key? key}) : super(key: key);

  @override
  final code = 'UnconstrainedBox(\n'
      '   child: Container(color: red, width: 4000, height: 50));';
  @override
  final String explanation =
      'The screen forces the UnconstrainedBox to be exactly the same size
as the screen, '
      'and UnconstrainedBox lets its child Container be any size it wants.'
      '\n\n'
      'Unfortunately, in this case the Container has 4000 pixels of width
and is too big to fit in the UnconstrainedBox, '
      'so the UnconstrainedBox displays the much dreaded "overflow
warning".';

  @override
  Widget build(BuildContext context) {
    return UnconstrainedBox(
      child: Container(color: red, width: 4000, height: 50),
    );
  }
}

//////////////////////////////////////////////////

class Example15 extends Example {
  const Example15({Key? key}) : super(key: key);

  @override
  final code = 'OverflowBox(\n'
      '   minWidth: 0.0,'
      '   minHeight: 0.0,'
      '   maxWidth: double.infinity,'
      '   maxHeight: double.infinity,'
      '   child: Container(color: red, width: 4000, height: 50));';
  @override
  final String explanation =
      'The screen forces the OverflowBox to be exactly the same size as the
screen, '
      'and OverflowBox lets its child Container be any size it wants.'
      '\n\n'
      'OverflowBox is similar to UnconstrainedBox, and the difference is
that it won\'t display any warnings if the child doesn\'t fit the space.'
      '\n\n'
      'In this case the Container is 4000 pixels wide, and is too big to
fit in the OverflowBox, '
      'but the OverflowBox simply shows as much as it can, with no warnings
```

```
given.';

  @override
  Widget build(BuildContext context) {
    return OverflowBox(
      minWidth: 0.0,
      minHeight: 0.0,
      maxWidth: double.infinity,
      maxHeight: double.infinity,
      child: Container(color: red, width: 4000, height: 50),
    );
  }
}

//////////////////////////////////////////////////

class Example16 extends Example {
  const Example16({Key? key}) : super(key: key);

  @override
  final code = 'UnconstrainedBox(\n'
      '   child: Container(color: Colors.red, width: double.infinity,
height: 100));';
  @override
  final String explanation =
      'This won\'t render anything, and you\'ll see an error in the
console.'
      '\n\n'
      'The UnconstrainedBox lets its child be any size it wants, '
      'however its child is a Container with infinite size.'
      '\n\n'
      'Flutter can\'t render infinite sizes, so it throws an error with the
following message: '
      '"BoxConstraints forces an infinite width."';

  @override
  Widget build(BuildContext context) {
    return UnconstrainedBox(
      child: Container(color: Colors.red, width: double.infinity, height:
100),
    );
  }
}
```

```
//////////////////////////////////////////////////

class Example17 extends Example {
  const Example17({Key? key}) : super(key: key);

  @override
  final code = 'UnconstrainedBox(\n'
      '   child: LimitedBox(maxWidth: 100,\n'
      '      child: Container(color: Colors.red,\n'
      '                       width: double.infinity, height: 100));';
  @override
  final String explanation = 'Here you won\'t get an error anymore, '
      'because when the LimitedBox is given an infinite size by the
UnconstrainedBox, '
      'it passes a maximum width of 100 down to its child.'
      '\n\n'
      'If you swap the UnconstrainedBox for a Center widget, '
      'the LimitedBox won\'t apply its limit anymore (since its limit is
only applied when it gets infinite constraints), '
      'and the width of the Container is allowed to grow past 100.'
      '\n\n'
      'This explains the difference between a LimitedBox and a
ConstrainedBox.';

  @override
  Widget build(BuildContext context) {
    return UnconstrainedBox(
      child: LimitedBox(
        maxWidth: 100,
        child: Container(
          color: Colors.red,
          width: double.infinity,
          height: 100,
        ),
      ),
    );
  }
}

//////////////////////////////////////////////////

class Example18 extends Example {
```

```dart
  const Example18({Key? key}) : super(key: key);

  @override
  final code = 'FittedBox(\n'
      '   child: Text(\'Some Example Text.\'));';
  @override
  final String explanation =
      'The screen forces the FittedBox to be exactly the same size as the
screen.'
      'The Text has some natural width (also called its intrinsic width)
that depends on the amount of text, its font size, and so on.'
      '\n\n'
      'The FittedBox lets the Text be any size it wants, '
      'but after the Text tells its size to the FittedBox, '
      'the FittedBox scales the Text until it fills all of the available
width.';

  @override
  Widget build(BuildContext context) {
    return const FittedBox(
      child: Text('Some Example Text.'),
    );
  }
}

//////////////////////////////////////////////////

class Example19 extends Example {
  const Example19({Key? key}) : super(key: key);

  @override
  final code = 'Center(\n'
      '   child: FittedBox(\n'
      '      child: Text(\'Some Example Text.\')));';
  @override
  final String explanation =
      'But what happens if you put the FittedBox inside of a Center widget?
'
      'The Center lets the FittedBox be any size it wants, up to the screen
size.'
      '\n\n'
      'The FittedBox then sizes itself to the Text, and lets the Text be
any size it wants.'
```

```
      '\n\n'
      'Since both FittedBox and the Text have the same size, no scaling
happens.';

  @override
  Widget build(BuildContext context) {
    return const Center(
      child: FittedBox(
        child: Text('Some Example Text.'),
      ),
    );
  }
}

//////////////////////////////////////////////////////////////////////

class Example20 extends Example {
  const Example20({Key? key}) : super(key: key);

  @override
  final code = 'Center(\n'
      '   child: FittedBox(\n'
      '      child: Text(\'...\')));';
  @override
  final String explanation =
      'However, what happens if FittedBox is inside of a Center widget, but
the Text is too large to fit the screen?'
      '\n\n'
      'FittedBox tries to size itself to the Text, but it can\'t be bigger
than the screen. '
      'It then assumes the screen size, and resizes Text so that it fits
the screen, too.';

  @override
  Widget build(BuildContext context) {
    return const Center(
      child: FittedBox(
        child: Text(
            'This is some very very very large text that is too big to fit
a regular screen in a single line.'),
      ),
    );
  }
```

```dart
}

//////////////////////////////////////////////////

class Example21 extends Example {
  const Example21({Key? key}) : super(key: key);

  @override
  final code = 'Center(\n'
      '   child: Text(\'...\'));';
  @override
  final String explanation = 'If, however, you remove the FittedBox, '
      'the Text gets its maximum width from the screen, '
      'and breaks the line so that it fits the screen.';

  @override
  Widget build(BuildContext context) {
    return const Center(
      child: Text(
          'This is some very very very large text that is too big to fit a
regular screen in a single line.'),
    );
  }
}

//////////////////////////////////////////////////

class Example22 extends Example {
  const Example22({Key? key}) : super(key: key);

  @override
  final code = 'FittedBox(\n'
      '   child: Container(\n'
      '      height: 20.0, width: double.infinity));';
  @override
  final String explanation =
      'FittedBox can only scale a widget that is BOUNDED (has non-infinite
width and height).'
      'Otherwise, it won\'t render anything, and you\'ll see an error in
the console.';

  @override
  Widget build(BuildContext context) {
    return FittedBox(
      child: Container(
        height: 20.0,
        width: double.infinity,
        color: Colors.red,
      ),
    );
  }
}

//////////////////////////////////////////////////

class Example23 extends Example {
  const Example23({Key? key}) : super(key: key);

  @override
  final code = 'Row(children:[\n'
      '   Container(color: red, child: Text(\'Hello!\'))\n'
      '   Container(color: green, child: Text(\'Goodbye!\'))]';
  @override
  final String explanation =
      'The screen forces the Row to be exactly the same size as the
screen.'
      '\n\n'
      'Just like an UnconstrainedBox, the Row won\'t impose any constraints
onto its children, '
      'and instead lets them be any size they want.'
      '\n\n'
      'The Row then puts them side-by-side, and any extra space remains
empty.';

  @override
  Widget build(BuildContext context) {
    return Row(
      children: [
        Container(color: red, child: const Text('Hello!', style: big)),
        Container(color: green, child: const Text('Goodbye!', style: big)),
      ],
    );
  }
}

//////////////////////////////////////////////////
```

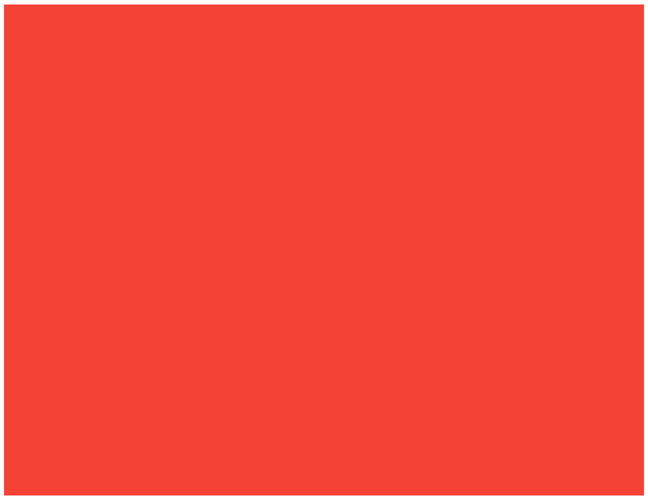
```dart
class Example24 extends Example {
  const Example24({Key? key}) : super(key: key);

  @override
  final code = 'Row(children:[\n'
      '   Container(color: red, child: Text(\'...\'))\n'
      '   Container(color: green, child: Text(\'Goodbye!\'))]';
  @override
  final String explanation =
      'Since the Row won\'t impose any constraints onto its children, '
      'it\'s quite possible that the children might be too big to fit the
available width of the Row.'
      'In this case, just like an UnconstrainedBox, the Row displays the
"overflow warning".';

  @override
  Widget build(BuildContext context) {
    return Row(
      children: [
        Container(
          color: red,
          child: const Text(
            'This is a very long text that '
            'won\'t fit the line.',
            style: big,
          ),
        ),
        Container(color: green, child: const Text('Goodbye!', style: big)),
      ],
    );
  }
}

//////////////////////////////////////////////////

class Example25 extends Example {
  const Example25({Key? key}) : super(key: key);

  @override
  final code = 'Row(children:[\n'
      '   Expanded(\n'
      '       child: Container(color: red, child: Text(\'...\')))\n'
      '   Container(color: green, child: Text(\'Goodbye!\'))]';
  @override
  final String explanation =
      'When a Row\'s child is wrapped in an Expanded widget, the Row won\'t
let this child define its own width anymore.'
      '\n\n'
      'Instead, it defines the Expanded width according to the other
children, and only then the Expanded widget forces the original child to
have the Expanded\'s width.'
      '\n\n'
      'In other words, once you use Expanded, the original child\'s width
becomes irrelevant, and is ignored.';

  @override
  Widget build(BuildContext context) {
    return Row(
      children: [
        Expanded(
          child: Center(
            child: Container(
              color: red,
              child: const Text(
                'This is a very long text that won\'t fit the line.',
                style: big,
              ),
            ),
          ),
        ),
        Container(color: green, child: const Text('Goodbye!', style: big)),
      ],
    );
  }
}

//////////////////////////////////////////////////

class Example26 extends Example {
  const Example26({Key? key}) : super(key: key);

  @override
  final code = 'Row(children:[\n'
      '   Expanded(\n'
      '       child: Container(color: red, child: Text(\'...\')))\n'
      '   Expanded(\n'
      '       child: Container(color: green, child: Text(\'Goodbye!\'))]';
  @override
  final String explanation =
      'If all of Row\'s children are wrapped in Expanded widgets, each
Expanded has a size proportional to its flex parameter, '
      'and only then each Expanded widget forces its child to have the
Expanded\'s width.'
      '\n\n'
      'In other words, Expanded ignores the preffered width of its
children.';

  @override
  Widget build(BuildContext context) {
    return Row(
      children: [
        Expanded(
          child: Container(
            color: red,
            child: const Text(
              'This is a very long text that won\'t fit the line.',
              style: big,
            ),
          ),
        ),
        Expanded(
          child: Container(
            color: green,
            child: const Text(
              'Goodbye!',
              style: big,
            ),
          ),
        ),
      ],
    );
  }
}

//////////////////////////////////////////////////

class Example27 extends Example {
  const Example27({Key? key}) : super(key: key);
  @override
  final code = 'Row(children:[\n'
      '   Flexible(\n'
      '       child: Container(color: red, child: Text(\'...\')))\n'
      '   Flexible(\n'
      '       child: Container(color: green, child: Text(\'Goodbye!\'))]';
  @override
  final String explanation =
      'The only difference if you use Flexible instead of Expanded, '
      'is that Flexible lets its child be SMALLER than the Flexible width,
'
      'while Expanded forces its child to have the same width of the
Expanded.'
      '\n\n'
      'But both Expanded and Flexible ignore their children\'s width when
sizing themselves.'
      '\n\n'
      'This means that it\'s IMPOSSIBLE to expand Row children
proportionally to their sizes. '
      'The Row either uses the exact child\'s width, or ignores it
completely when you use Expanded or Flexible.';

  @override
  Widget build(BuildContext context) {
    return Row(
      children: [
        Flexible(
          child: Container(
            color: red,
            child: const Text(
              'This is a very long text that won\'t fit the line.',
              style: big,
            ),
          ),
        ),
        Flexible(
          child: Container(
            color: green,
            child: const Text(
              'Goodbye!',
              style: big,
            ),
```

```dart
          ),
        ),
      ],
    );
  }
}

//////////////////////////////////////////////////

class Example28 extends Example {
  const Example28({Key? key}) : super(key: key);

  @override
  final code = 'Scaffold(\n'
      '   body: Container(color: blue,\n'
      '   child: Column(\n'
      '      children: [\n'
      '         Text(\'Hello!\'),\n'
      '         Text(\'Goodbye!\')])))';

  @override
  final String explanation =
      'The screen forces the Scaffold to be exactly the same size as the
screen,'
      'so the Scaffold fills the screen.'
      '\n\n'
      'The Scaffold tells the Container that it can be any size it wants,
but not bigger than the screen.'
      '\n\n'
      'When a widget tells its child that it can be smaller than a certain
size, '
      'we say the widget supplies "loose" constraints to its child. More on
that later.';

  @override
  Widget build(BuildContext context) {
    return Scaffold(
      body: Container(
        color: blue,
        child: Column(
          children: const [
            Text('Hello!'),
            Text('Goodbye!'),
        ],
      ),
    ),
  );
 }
}

//////////////////////////////////////////////////

class Example29 extends Example {
  const Example29({Key? key}) : super(key: key);

  @override
  final code = 'Scaffold(\n'
      '   body: Container(color: blue,\n'
      '   child: SizedBox.expand(\n'
      '      child: Column(\n'
      '         children: [\n'
      '            Text(\'Hello!\'),\n'
      '            Text(\'Goodbye!\')]))))';

  @override
  final String explanation =
      'If you want the Scaffold\'s child to be exactly the same size as the
Scaffold itself, '
      'you can wrap its child with SizedBox.expand.'
      '\n\n'
      'When a widget tells its child that it must be of a certain size, '
      'we say the widget supplies "tight" constraints to its child. More on
that later.';

  @override
  Widget build(BuildContext context) {
    return Scaffold(
      body: SizedBox.expand(
        child: Container(
          color: blue,
          child: Column(
            children: const [
              Text('Hello!'),
              Text('Goodbye!'),
            ],
          ),
        ),
      ),
    );
  }
}

//////////////////////////////////////////////////
```

If you prefer, you can grab the code from this GitHub repo.

The examples are explained in the following sections.

Example 1



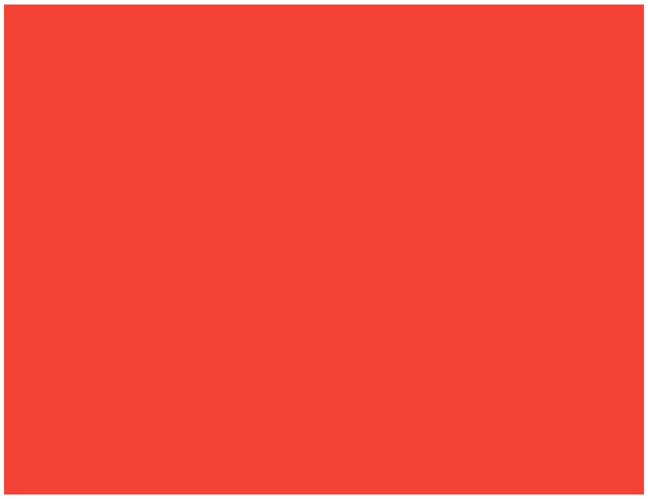
content_copy

`Container(color: red)`

The screen is the parent of the `Container`, and it forces the `Container` to be exactly the same size as the screen.

So the `Container` fills the screen and paints it red.

Example 2



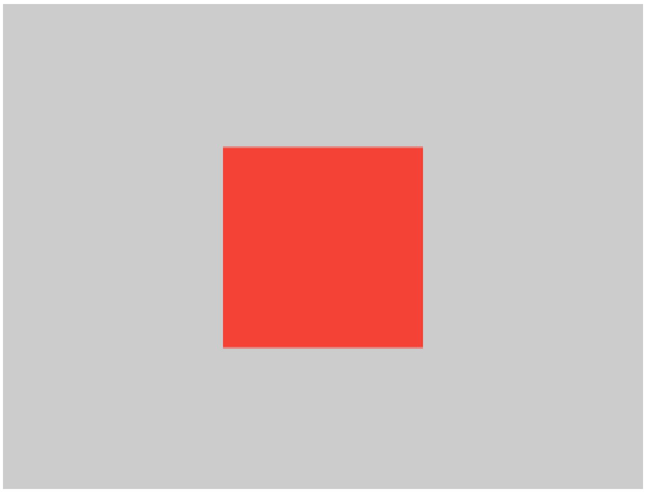
content_copy

```
Container(width: 100, height: 100, color: red)
```

The red `Container` wants to be 100 × 100, but it can't, because the screen forces it to be exactly the same size as the screen.

So the `Container` fills the screen.

Example 3



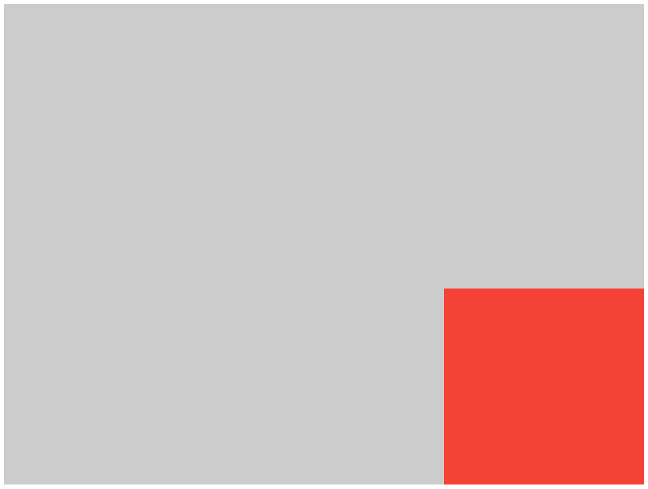
content_copy

```
Center(
  child: Container(width: 100, height: 100, color: red),
)
```

The screen forces the `Center` to be exactly the same size as the screen, so the `Center` fills the screen.

The `Center` tells the `Container` that it can be any size it wants, but not bigger than the screen. Now the `Container` can indeed be 100 × 100.

Example 4



content_copy

```
Align(
  alignment: Alignment.bottomRight,
  child: Container(width: 100, height: 100, color: red),
)
```

This is different from the previous example in that it uses `Align` instead of `Center`.

`Align` also tells the `Container` that it can be any size it wants, but if there is empty space it won't center the `Container`. Instead, it aligns the container to the bottom-right of the available space.

Example 5

content_copy

```
Center(
  child: Container(
      width: double.infinity, height: double.infinity, color: red),
)
```

The screen forces the `Center` to be exactly the same size as the screen, so the `Center` fills the screen.

The `Center` tells the `Container` that it can be any size it wants, but not bigger than the screen. The `Container` wants to be of infinite size, but since it can't be bigger than the screen, it just fills the screen.

Example 6

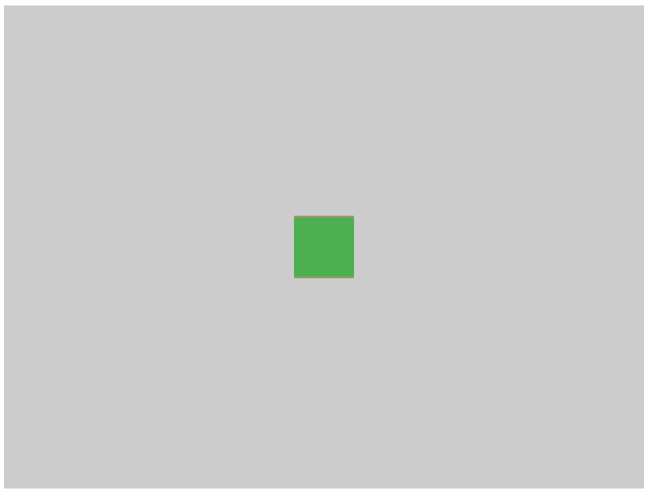
content_copy

```
Center(
  child: Container(color: red),
)
```
The screen forces the `Center` to be exactly the same size as the screen, so the `Center` fills the screen.

The `Center` tells the `Container` that it can be any size it wants, but not bigger than the screen. Since the `Container` has no child and no fixed size, it decides it wants to be as big as possible, so it fills the whole screen.

But why does the `Container` decide that? Simply because that's a design decision by those who created the `Container` widget. It could have been created differently, and you have to read the `Container` documentation to understand how it behaves, depending on the circumstances.

Example 7



content_copy

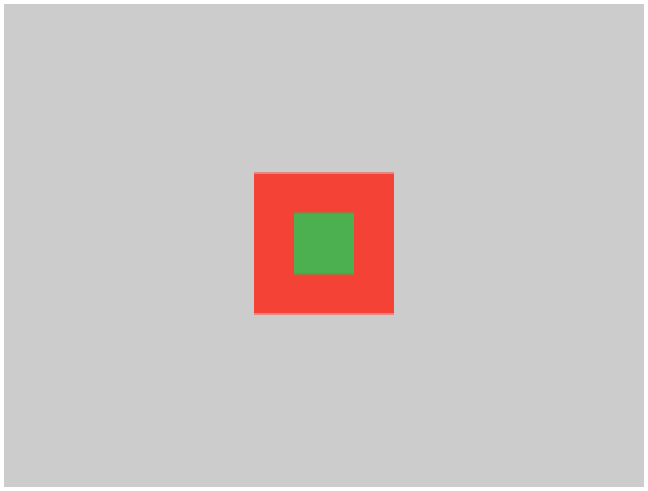
```
Center(
  child: Container(
    color: red,
    child: Container(color: green, width: 30, height: 30),
  ),
)
```
The screen forces the `Center` to be exactly the same size as the screen, so the `Center` fills the screen.

The Center tells the red Container that it can be any size it wants, but not bigger than the screen. Since the red Container has no size but has a child, it decides it wants to be the same size as its child.

The red Container tells its child that it can be any size it wants, but not bigger than the screen.

The child is a green Container that wants to be 30 × 30. Given that the red Container sizes itself to the size of its child, it is also 30 × 30. The red color isn't visible because the green Container entirely covers the red Container.

Example 8



content_copy

```
Center(
  child: Container(
    padding: const EdgeInsets.all(20.0),
    color: red,
    child: Container(color: green, width: 30, height: 30),
  ),
)
```

The red Container sizes itself to its children's size, but it takes its own padding into consideration. So it is also 30 × 30 plus padding. The red color is visible because of the padding, and the green Container has the same size as in the previous example.

Example 9

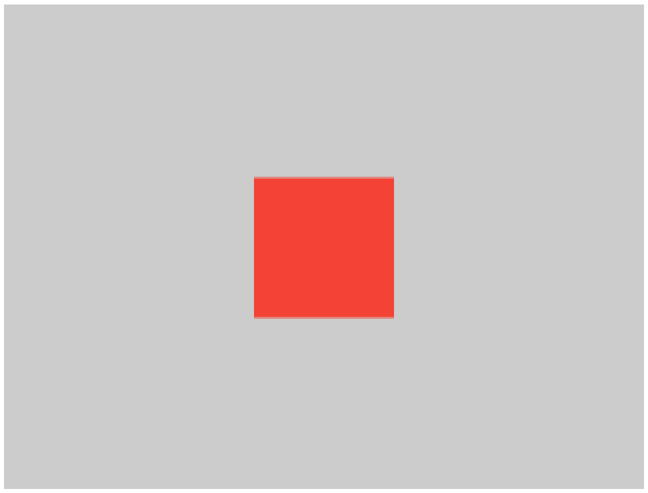
content_copy

```
ConstrainedBox(
  constraints: const BoxConstraints(
    minWidth: 70,
    minHeight: 70,
    maxWidth: 150,
    maxHeight: 150,
  ),
  child: Container(color: red, width: 10, height: 10),
)
```

You might guess that the `Container` has to be between 70 and 150 pixels, but you would be wrong. The `ConstrainedBox` only imposes additional constraints from those it receives from its parent.

Here, the screen forces the `ConstrainedBox` to be exactly the same size as the screen, so it tells its child `Container` to also assume the size of the screen, thus ignoring its `constraints` parameter.

Example 10



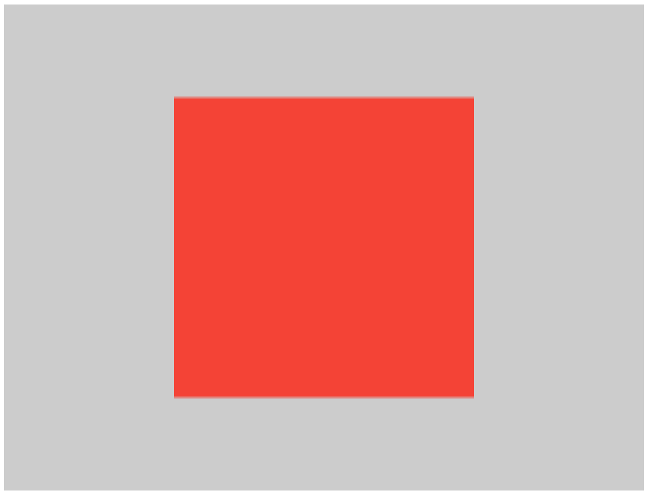
content_copy

```
Center(
  child: ConstrainedBox(
    constraints: const BoxConstraints(
      minWidth: 70,
      minHeight: 70,
      maxWidth: 150,
      maxHeight: 150,
    ),
    child: Container(color: red, width: 10, height: 10),
  ),
)
```

Now, `Center` allows `ConstrainedBox` to be any size up to the screen size. The `ConstrainedBox` imposes additional constraints from its `constraints` parameter onto its child.

The Container must be between 70 and 150 pixels. It wants to have 10 pixels, so it ends up having 70 (the minimum).

Example 11



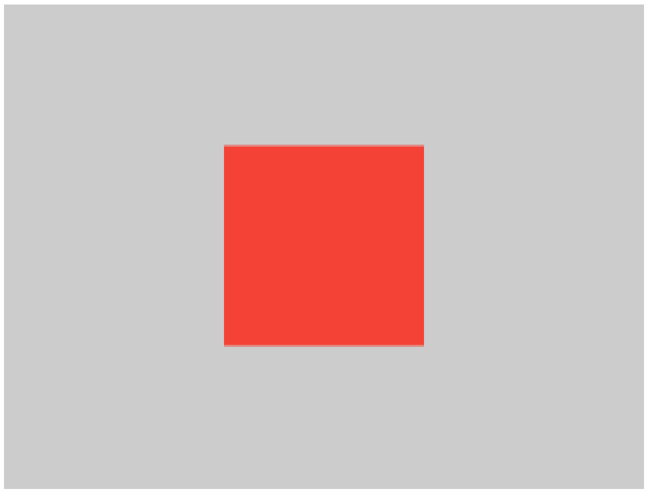
content_copy

```
Center(
  child: ConstrainedBox(
    constraints: const BoxConstraints(
      minWidth: 70,
      minHeight: 70,
      maxWidth: 150,
      maxHeight: 150,
    ),
    child: Container(color: red, width: 1000, height: 1000),
  ),
)
```

`Center` allows `ConstrainedBox` to be any size up to the screen size. The `ConstrainedBox` imposes additional constraints from its `constraints` parameter onto its child.

The `Container` must be between 70 and 150 pixels. It wants to have 1000 pixels, so it ends up having 150 (the maximum).

Example 12



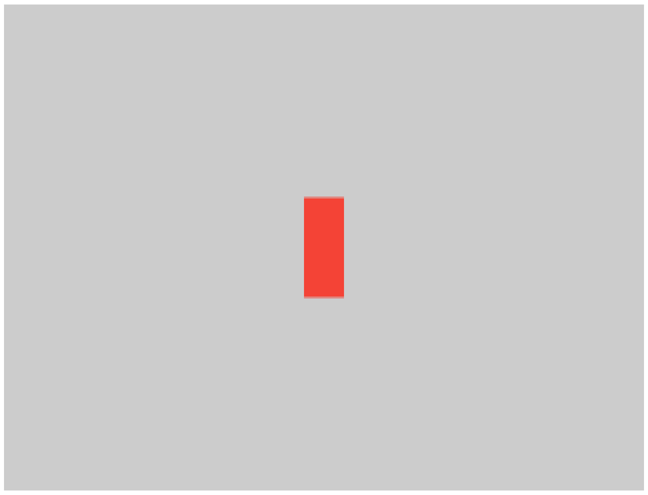
content_copy

```
Center(
  child: ConstrainedBox(
    constraints: const BoxConstraints(
      minWidth: 70,
      minHeight: 70,
      maxWidth: 150,
      maxHeight: 150,
    ),
    child: Container(color: red, width: 100, height: 100),
  ),
)
```

`Center` allows `ConstrainedBox` to be any size up to the screen size. The `ConstrainedBox` imposes additional constraints from its `constraints` parameter onto its child.

The `Container` must be between 70 and 150 pixels. It wants to have 100 pixels, and that’s the size it has, since that’s between 70 and 150.

Example 13

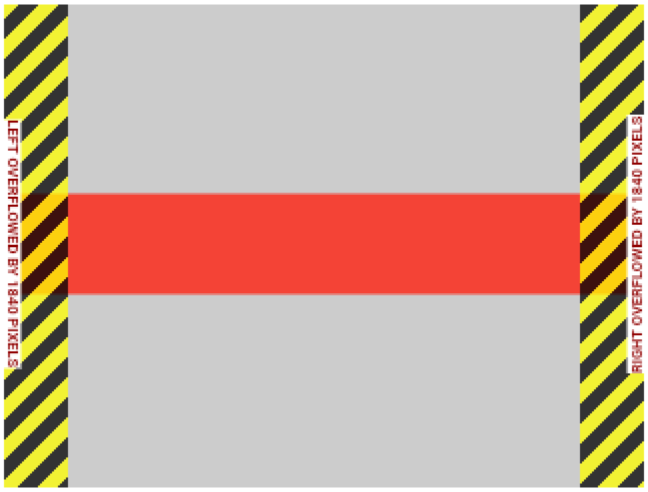


content_copy

```
UnconstrainedBox(
  child: Container(color: red, width: 20, height: 50),
)
```

The screen forces the `UnconstrainedBox` to be exactly the same size as the screen. However, the `UnconstrainedBox` lets its child `Container` be any size it wants.

Example 14


LEFT OVERFLOWED BY 1840 PIXELS
RIGHT OVERFLOWED BY 1840 PIXELS

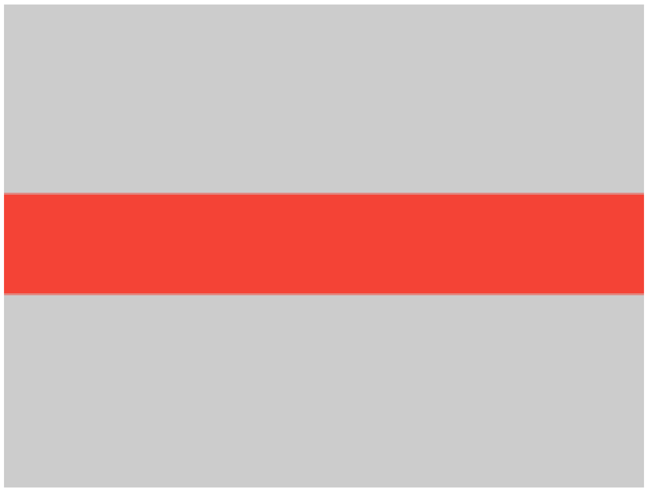
content_copy

```
UnconstrainedBox(
  child: Container(color: red, width: 4000, height: 50),
)
```

The screen forces the `UnconstrainedBox` to be exactly the same size as the screen, and `UnconstrainedBox` lets its child `Container` be any size it wants.

Unfortunately, in this case the `Container` is 4000 pixels wide and is too big to fit in the `UnconstrainedBox`, so the `UnconstrainedBox` displays the much dreaded “overflow warning”.

Example 15



content_copy

```
OverflowBox(
  minWidth: 0.0,
  minHeight: 0.0,
  maxWidth: double.infinity,
  maxHeight: double.infinity,
  child: Container(color: red, width: 4000, height: 50),
)
```

The screen forces the `OverflowBox` to be exactly the same size as the screen, and `OverflowBox` lets its child `Container` be any size it wants.

`OverflowBox` is similar to `UnconstrainedBox`; the difference is that it won’t display any warnings if the child doesn’t fit the space.

In this case, the `Container` has 4000 pixels of width, and is too big to fit in the `OverflowBox`, but the `OverflowBox` simply shows as much as it can, with no warnings given.

Example 16

content_copy

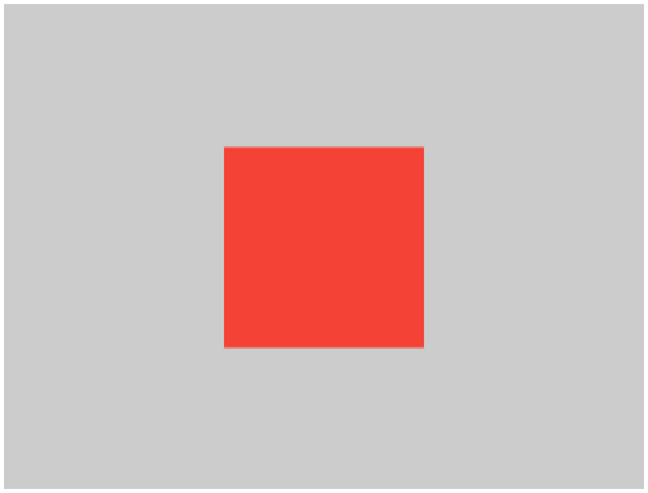
```
UnconstrainedBox(
  child: Container(color: Colors.red, width: double.infinity, height:
100),
)
```

This won't render anything, and you'll see an error in the console.

The `UnconstrainedBox` lets its child be any size it wants, however its child is a `Container` with infinite size.

Flutter can't render infinite sizes, so it throws an error with the following message: `BoxConstraints forces an infinite width.`

Example 17



content_copy

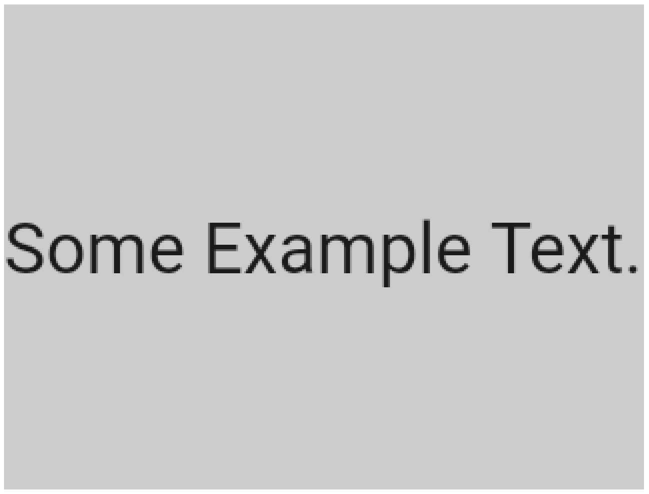
```
UnconstrainedBox(
  child: LimitedBox(
    maxWidth: 100,
    child: Container(
      color: Colors.red,
      width: double.infinity,
      height: 100,
    ),
  ),
)
```

Here you won't get an error anymore, because when the `LimitedBox` is given an infinite size by the `UnconstrainedBox`; it passes a maximum width of 100 down to its child.

If you swap the `UnconstrainedBox` for a `Center` widget, the `LimitedBox` won't apply its limit anymore (since its limit is only applied when it gets infinite constraints), and the width of the `Container` is allowed to grow past 100.

This explains the difference between a `LimitedBox` and a `ConstrainedBox`.

Example 18



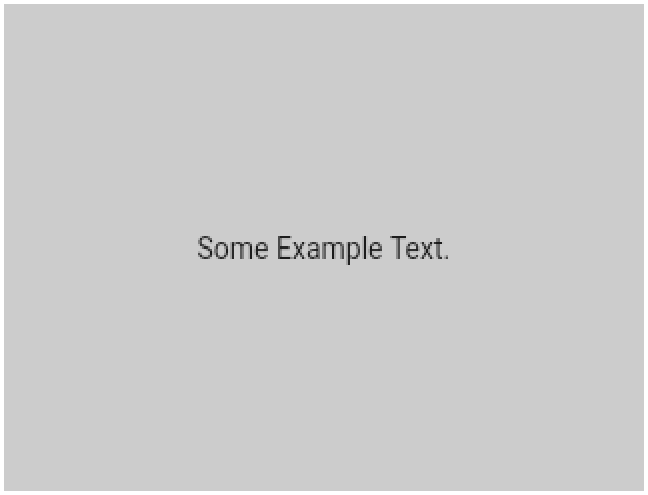
content_copy

```
const FittedBox(
  child: Text('Some Example Text.'),
)
```

The screen forces the `FittedBox` to be exactly the same size as the screen. The `Text` has some natural width (also called its intrinsic width) that depends on the amount of text, its font size, and so on.

The `FittedBox` lets the `Text` be any size it wants, but after the `Text` tells its size to the `FittedBox`, the `FittedBox` scales the Text until it fills all of the available width.

Example 19



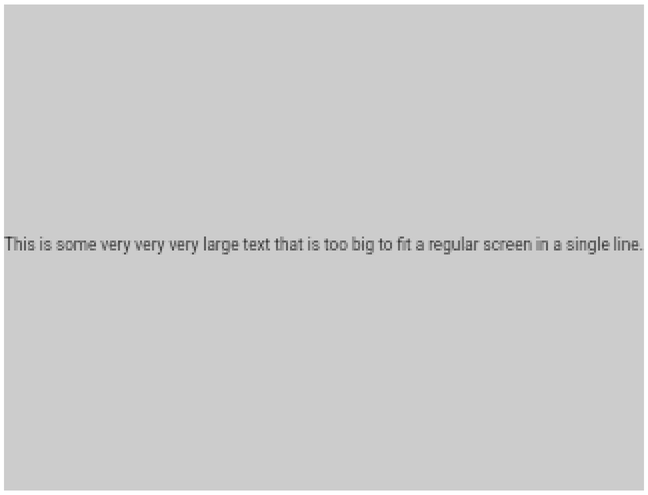
content_copy

```
const Center(
  child: FittedBox(
    child: Text('Some Example Text.'),
  ),
)
```

But what happens if you put the `FittedBox` inside of a `Center` widget? The `Center` lets the `FittedBox` be any size it wants, up to the screen size.

The `FittedBox` then sizes itself to the `Text`, and lets the `Text` be any size it wants. Since both `FittedBox` and the `Text` have the same size, no scaling happens.

Example 20



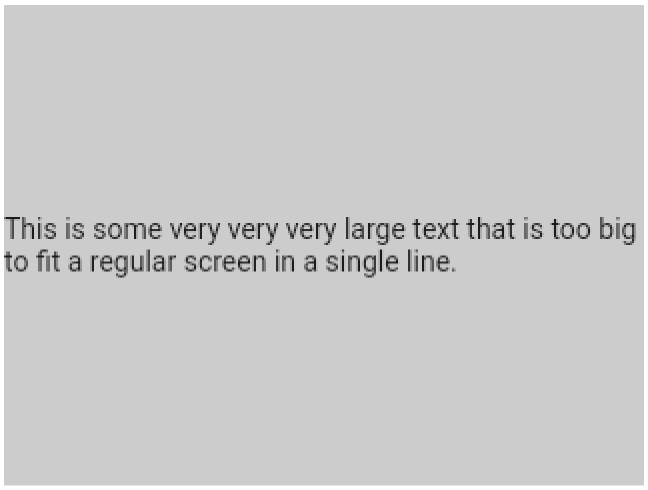
content_copy

```
const Center(
  child: FittedBox(
    child: Text(
        'This is some very very very large text that is too big to fit a regular screen in a single line.'),
  ),
)
```

However, what happens if `FittedBox` is inside of a `Center` widget, but the `Text` is too large to fit the screen?

`FittedBox` tries to size itself to the `Text`, but it can’t be bigger than the screen. It then assumes the screen size, and resizes `Text` so that it fits the screen, too.

Example 21



content_copy

```
const Center(
  child: Text(
      'This is some very very very large text that is too big to fit a regular screen in a single line.'),
)
```

If, however, you remove the `FittedBox`, the `Text` gets its maximum width from the screen, and breaks the line so that it fits the screen.

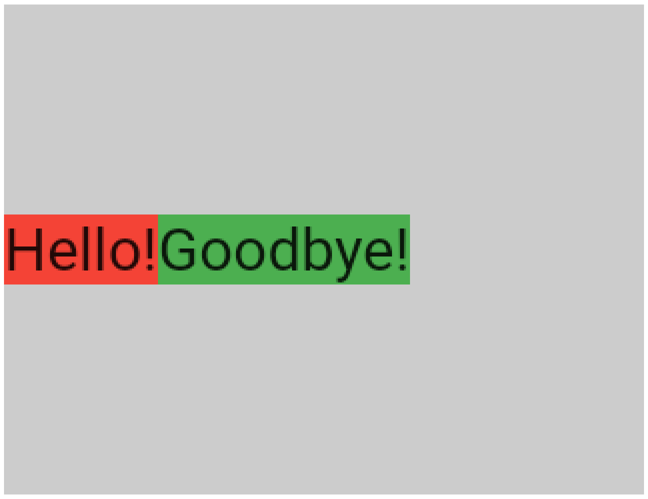
Example 22

content_copy

```
FittedBox(
  child: Container(
    height: 20.0,
    width: double.infinity,
    color: Colors.red,
  ),
)
```

`FittedBox` can only scale a widget that is bounded (has non-infinite width and height). Otherwise, it won't render anything, and you'll see an error in the console.

Example 23



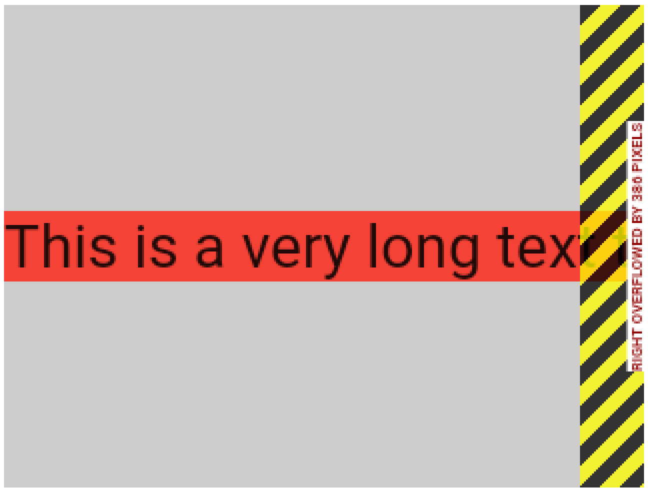
content_copy

```
Row(
  children: [
    Container(color: red, child: const Text('Hello!', style: big)),
    Container(color: green, child: const Text('Goodbye!', style: big)),
  ],
)
```

The screen forces the `Row` to be exactly the same size as the screen.

Just like an `UnconstrainedBox`, the `Row` won't impose any constraints onto its children, and instead lets them be any size they want. The `Row` then puts them side-by-side, and any extra space remains empty.

Example 24

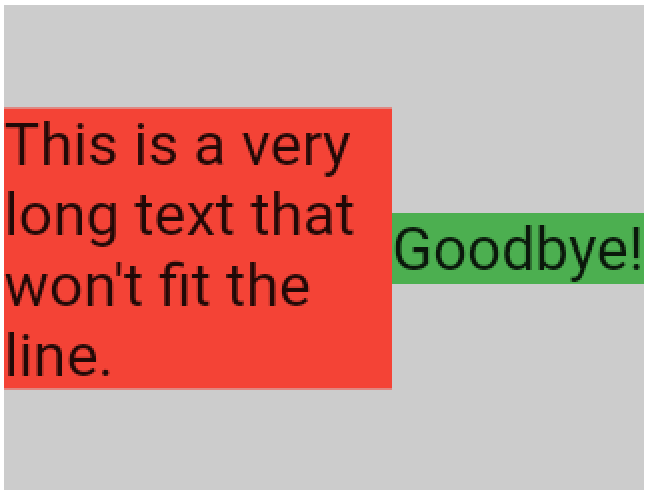


content_copy

```
Row(
  children: [
    Container(
      color: red,
      child: const Text(
        'This is a very long text that '
        'won\'t fit the line.',
        style: big,
      ),
    ),
    Container(color: green, child: const Text('Goodbye!', style: big)),
  ],
)
```

Since `Row` won't impose any constraints onto its children, it's quite possible that the children might be too big to fit the available width of the `Row`. In this case, just like an `UnconstrainedBox`, the `Row` displays the "overflow warning".

Example 25



content_copy

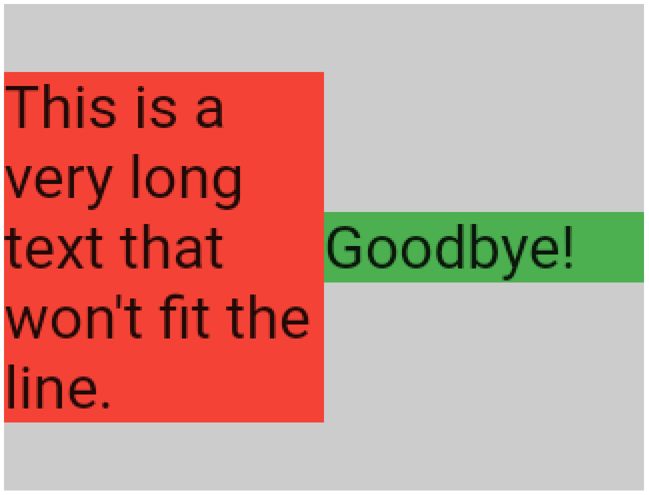
```
Row(
  children: [
    Expanded(
      child: Center(
        child: Container(
          color: red,
          child: const Text(
            'This is a very long text that won\'t fit the line.',
            style: big,
          ),
        ),
      ),
    ),
    Container(color: green, child: const Text('Goodbye!', style: big)),
  ],
)
```

When a Row's child is wrapped in an Expanded widget, the Row won't let this child define its own width anymore.

Instead, it defines the Expanded width according to the other children, and only then the Expanded widget forces the original child to have the Expanded's width.

In other words, once you use Expanded, the original child's width becomes irrelevant, and is ignored.

Example 26

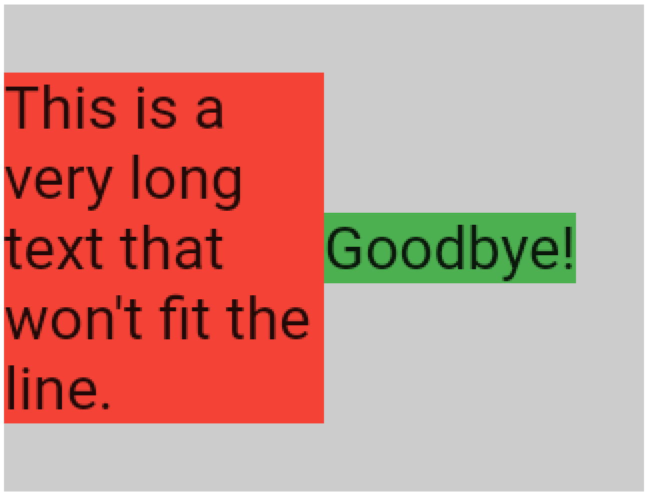


content_copy

```
Row(
  children: [
    Expanded(
      child: Container(
        color: red,
        child: const Text(
          'This is a very long text that won\'t fit the line.',
          style: big,
        ),
      ),
    ),
    Expanded(
      child: Container(
        color: green,
        child: const Text(
          'Goodbye!',
          style: big,
        ),
      ),
    ),
  ],
)
```
If all of `Row`'s children are wrapped in `Expanded` widgets, each `Expanded` has a size proportional to its flex parameter, and only then each `Expanded` widget forces its child to have the `Expanded`'s width.

In other words, `Expanded` ignores the preferred width of its children.

Example 27

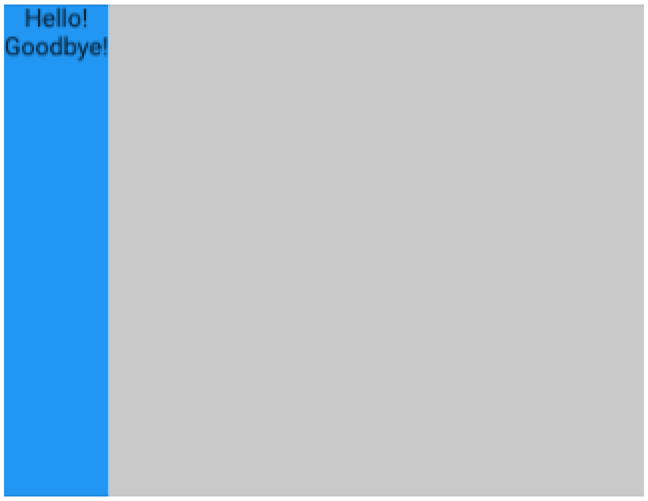


content_copy

```
Row(
  children: [
    Flexible(
      child: Container(
        color: red,
        child: const Text(
          'This is a very long text that won\'t fit the line.',
          style: big,
        ),
      ),
    ),
    Flexible(
      child: Container(
        color: green,
        child: const Text(
          'Goodbye!',
          style: big,
        ),
      ),
    ),
  ],
)
```
The only difference if you use `Flexible` instead of `Expanded`, is that `Flexible` lets its child have the same or smaller width than the `Flexible` itself, while `Expanded` forces its child to have the exact same width of the `Expanded`. But both `Expanded` and `Flexible` ignore their children's width when sizing themselves.

Note: This means that it's impossible to expand `Row` children proportionally to their sizes. The `Row` either uses the exact child's width, or ignores it completely when you use `Expanded` or `Flexible`.

Example 28



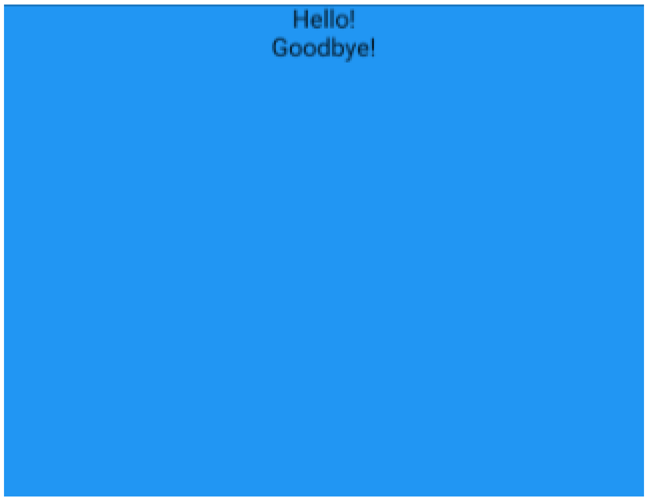
content_copy

```
Scaffold(
  body: Container(
    color: blue,
    child: Column(
      children: const [
        Text('Hello!'),
        Text('Goodbye!'),
      ],
    ),
  ),
)
```

The screen forces the `Scaffold` to be exactly the same size as the screen, so the `Scaffold` fills the screen. The `Scaffold` tells the `Container` that it can be any size it wants, but not bigger than the screen.

Note: When a widget tells its child that it can be smaller than a certain size, we say the widget supplies *loose* constraints to its child. More on that later.

Example 29



content_copy

```
Scaffold(
  body: SizedBox.expand(
    child: Container(
      color: blue,
      child: Column(
        children: const [
          Text('Hello!'),
          Text('Goodbye!'),
        ],
      ),
    ),
  ),
)
```

If you want the `Scaffold`'s child to be exactly the same size as the `Scaffold` itself, you can wrap its child with `SizedBox.expand`.

Note: When a widget tells its child that it must be of a certain size, we say the widget supplies *tight* constraints to its child.

Tight vs. loose constraints

It's very common to hear that some constraint is "tight" or "loose", so it's worth knowing what that means.

A *tight* constraint offers a single possibility, an exact size. In other words, a tight constraint has its maximum width equal to its minimum width; and has its maximum height equal to its minimum height.

If you go to Flutter's `box.dart` file and search for the `BoxConstraints` constructors, you'll find the following:

content_copy

```
BoxConstraints.tight(Size size)
   : minWidth = size.width,
     maxWidth = size.width,
     minHeight = size.height,
     maxHeight = size.height;
```

If you revisit Example 2 above, it tells us that the screen forces the red `Container` to be exactly the same size as the screen. The screen does that, of course, by passing tight constraints to the `Container`.

A *loose* constraint, on the other hand, sets the maximum width and height, but lets the widget be as small as it wants. In other words, a loose constraint has a minimum width and height both equal to zero:

content_copy

```
BoxConstraints.loose(Size size)
   : minWidth = 0.0,
     maxWidth = size.width,
     minHeight = 0.0,
     maxHeight = size.height;
```

If you revisit Example 3, it tells us that the `Center` lets the red `Container` be smaller, but not bigger than the screen. The `Center` does that, of course, by passing loose constraints to the `Container`. Ultimately, the `Center`'s very purpose is to transform the tight constraints it got from its parent (the screen) to loose constraints for its child (the `Container`).

Learning the layout rules for specific widgets

Knowing the general layout rule is necessary, but it's not enough.

Each widget has a lot of freedom when applying the general rule, so there is no way of knowing what it will do by just reading the widget's name.

If you try to guess, you'll probably guess wrong. You can't know exactly how a widget behaves unless you've read its documentation, or studied its source-code.

The layout source-code is usually complex, so it's probably better to just read the documentation. However, if you decide to study the layout source-code, you can easily find it by using the navigation capabilities of your IDE.

Here is an example:

- Find a `Column` in your code and navigate to its source code. To do this, use `command+B` (macOS) or `control+B` (Windows/Linux) in Android Studio or IntelliJ. You'll be taken to the `basic.dart` file. Since `Column` extends `Flex`, navigate to the `Flex` source code (also in `basic.dart`).
- Scroll down until you find a method called `createRenderObject()`. As you can see, this method returns a `RenderFlex`. This is the render-object for the `Column`. Now navigate to the source-code of `RenderFlex`, which takes you to the `flex.dart` file.
- Scroll down until you find a method called `performLayout()`. This is the method that does the layout for the `Column`.

Article by Marcelo Glasberg

Marcelo originally published this content as Flutter: The Advanced Layout Rule Even Beginners Must Know on Medium. We loved it and asked that he allow us to publish it on docs.flutter.dev, to which he graciously agreed. Thanks, Marcelo! You can find Marcelo on GitHub and pub.dev.

Also, thanks to Simon Lightfoot for creating the header image at the top of the article.