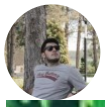
Paths in Flutter: A Visual Guide



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Flutter gives us a lot of standard views to use in our projects, but from time to time we need to create custom views. One of the most common way to do this is, using paths.
In this blog post, we will go through each function which in `Path` class and see how they behave.
But first, let's quickly go over our base playground.
p.s. I wanted to pick Totoro as a the header because of my latest trip to Japan and also it is cute :)
Also there is a path in the gif :)

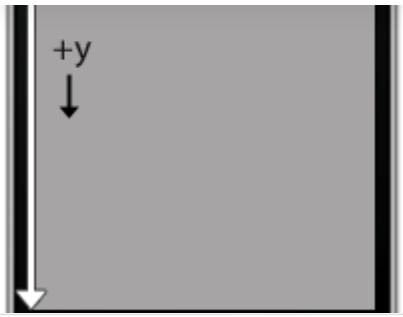
```dart
import 'package:flutter/material.dart';

void main() => runApp(
      MaterialApp(
        home: PathExample(),
      ),
    );

class PathExample extends StatelessWidget {
  @override
  Widget build(BuildContext context) {
```

```dart
class PathPainter extends CustomPainter {
  @override
  void paint(Canvas canvas, Size size) {
    Paint paint = Paint()
      ..color = Colors.red
      ..style = PaintingStyle.stroke
      ..strokeWidth = 8.0;

    Path path = Path();
    // TODO: do operations here
    path.close();
    canvas.drawPath(path, paint);
  }

  @override
  bool shouldRepaint(CustomPainter oldDelegate) => true;
}
```

base_playground.dart hosted with ♡ by GitHub view raw

Basically what we have here is a **StatelessWidget** with **CustomPaint** as a child and it gets our **CustomPainter** as a painter. `CustomPaint` is a widget that provides us a canvas to be used by the `CustomPainter` to paint what we provided in the `paint` method.
For painting options, we created a `Paint` object and decided to draw everything `stroke` style with a `width` of `8` in `color` red.
Next, we have our `Path` in our code to be used for drawing. `Path` is basically a collection of drawn elements. These elements are drawn according to its starting point. The initial starting point for a `Path` is (0,0).
Lastly, we have our `canvas` . We use canvas for drawing our `path` on it with the `paint` that we created.
Now that we are done with the playground, let's talk about the screen coordinate system in case it is not familiar to some people.

For the screen, the start point (0,0) is the screen's top left corner. X coordinate



screen is the positive visible limit and its value is the height of the screen.
Now we are ready to start.

moveTo

`moveTo` method helps us to move the starting point of the sub-path to the point provided within the method.

```dart
@override
void paint(Canvas canvas, Size size) {
  Paint paint = Paint()
    ..color = Colors.red
    ..style = PaintingStyle.stroke
    ..strokeWidth = 8.0;

  Path path = Path();
  // Moves starting point to the center of the screen
  path.moveTo(size.width / 2, size.height / 2);
  canvas.drawPath(path, paint);
}
```

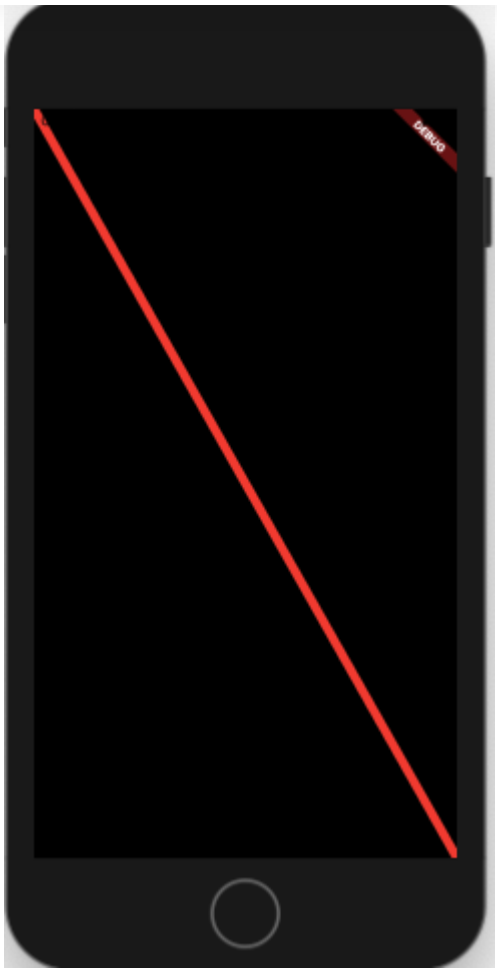
moveto_example.dart hosted with ♡ by GitHub view raw

Moves starting point to center

lineTo

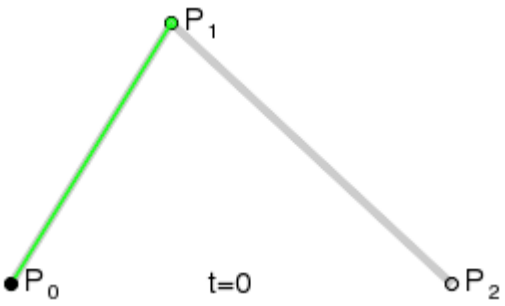
`lineTo` is the method to draw a line from the current point of the path to the point provided within the method.

```dart
@override
void paint(Canvas canvas, Size size) {
  Paint paint = Paint()
    ..color = Colors.red
    ..style = PaintingStyle.stroke
    ..strokeWidth = 8.0;

  Path path = Path();
  // Draws a line from left top corner to right bottom
  path.lineTo(size.width, size.height);
  canvas.drawPath(path, paint);
}
```



lineTo example

quadraticBezierTo



Source: Wikipedia

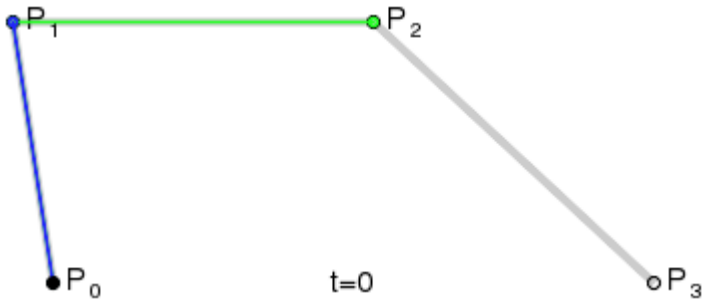
`quadraticBezierTo` method was for me the most complicated one to understand. It draws a Bezier Curves and as we learn from Mathematics, it does this with the control point provided.
Disclaimer: Since it's a complicated concept, I wanted to keep this as visual as possible, you can see how bezier curves are calculated.
From the left center of the screen, we draw a bezier curve to the right center of the screen.

```
1    @override
2    void paint(Canvas canvas, Size size) {
```

```
8       Path path = Path();
9       path.moveTo(0, size.height / 2);
10      path.quadraticBezierTo(size.width / 2, size.height, size.width, size.height / 2);
11      canvas.drawPath(path, paint);
12    }
```

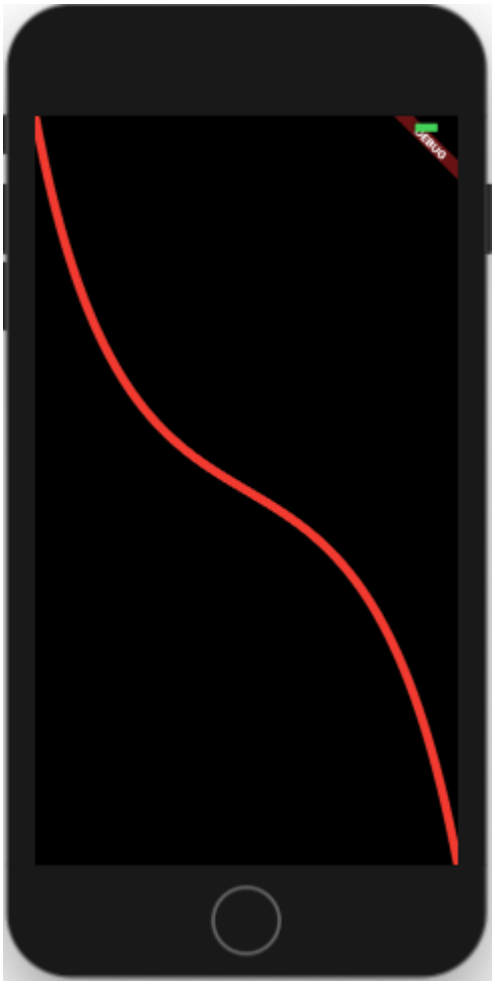
quadraticBezierTo_example.dart hosted with ♡ by GitHub view raw

cubicTo



```dart
    Paint paint = Paint()
      ..color = Colors.red
      ..style = PaintingStyle.stroke
      ..strokeWidth = 8.0;

    Path path = Path();
    path.cubicTo(size.width / 4, 3 * size.height / 4, 3 * size.width / 4, size.height / 4, size.
    canvas.drawPath(path, paint);
  }
```

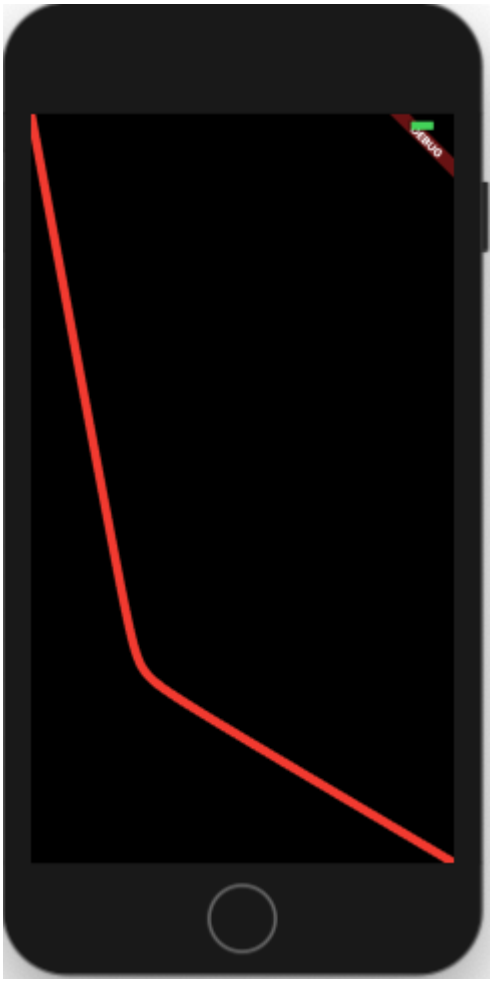
cubicto_example.dart hosted with ♡ by GitHub view raw



conicTo

```dart
  void paint(Canvas canvas, Size size) {
    Paint paint = Paint()
      ..color = Colors.red
      ..style = PaintingStyle.stroke
      ..strokeWidth = 8.0;

    Path path = Path();
    path.conicTo(size.width / 4, 3 * size.height / 4, size.width, size.height, 20);
    canvas.drawPath(path, paint);
  }
```

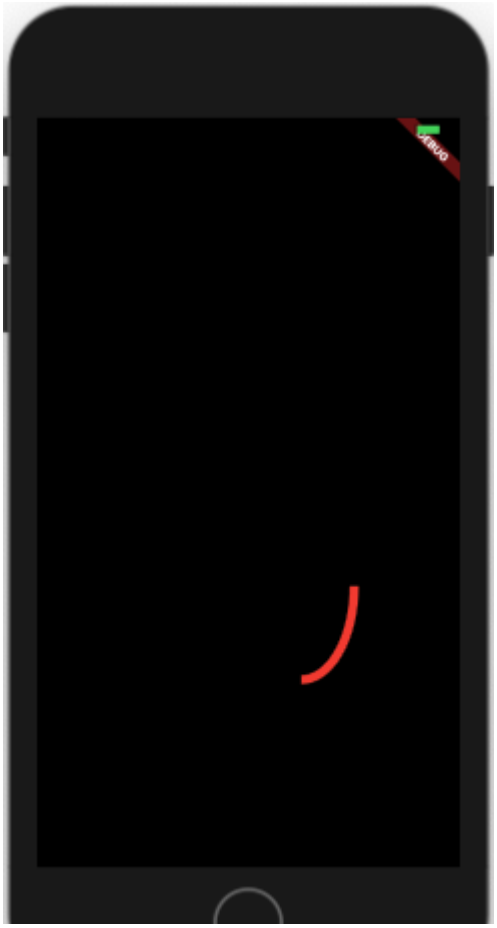
conicto_example.dart hosted with ♡ by GitHub view raw



arcTo

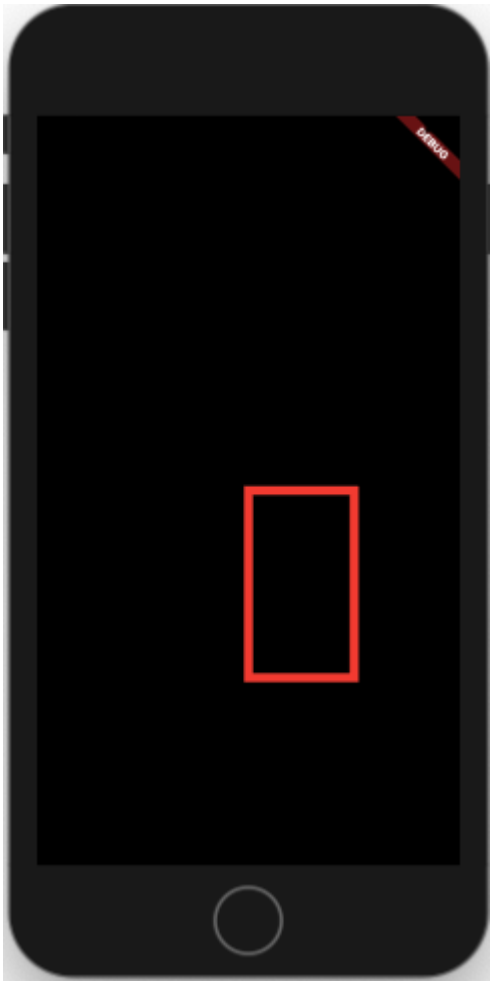
```dart
void paint(Canvas canvas, Size size) {
  Paint paint = Paint()
    ..color = Colors.red
    ..style = PaintingStyle.stroke
    ..strokeWidth = 8.0;

  // Method to convert degree to radians
  num degToRad(num deg) => deg * (Math.pi / 180.0);

  Path path = Path();
  path.arcTo(Rect.fromLTWH(size.width / 2, size.height / 2, size.width / 4, size.height / 4),
  canvas.drawPath(path, paint);
}
```

arcTo_example.dart hosted with ♡ by GitHub view raw



```
    Paint paint = Paint()
      ..color = Colors.red
      ..style = PaintingStyle.stroke
      ..strokeWidth = 8.0;

    Path path = Path();
    // Adds a rectangle
    path.addRect(Rect.fromLTWH(size.width / 2, size.height / 2, size.width / 4, size.height / 4)
    canvas.drawPath(path, paint);
  }
```

addrect_example.dart hosted with ♡ by GitHub view raw



addOval

`addOval` adds an oval as a sub-path. From the example above, we will only change the method call.

```
  @override
```

```
    Path path = Path();
    // Adds an oval
    path.addOval(Rect.fromLTWH(size.width / 2, size.height / 2, size.width / 4, size.height / 4)
    canvas.drawPath(path, paint);
  }
```

addoval_example.dart hosted with ♡ by GitHub view raw

addArc

`addArc` is acting as **arcTo.**

e.g. For drawing an arc starting from left middle edge to top edge of an oval, we will start from 3.14 which is the radian value for 180 and add 1.57 which is the radian value for 90.

For making things easier, I added a function to calculate the radian from degree.

```
  @override
  void paint(Canvas canvas, Size size) {
```

```
9       num degToRad(num deg) => deg * (Math.pi / 180.0);
10
11      Path path = Path();
12      // Adds a quarter arc
13      path.addArc(Rect.fromLTWH(0, 0, size.width, size.height), degToRad(180), degToRad(90));
14      canvas.drawPath(path, paint);
15    }
```

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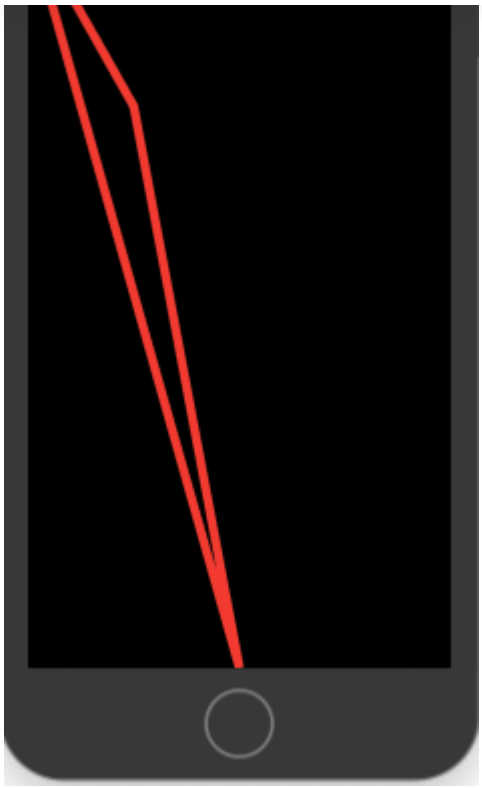
addPolygon

`addPolygon` method draws polygon from sets of points. It gets a set of Offset values which will be the positions for the polygon. Lastly it accepts a boolean, `true` acts like `path.close()` and draws a straight line between the last and first point and `false` does nothing.

```
1   @override
```

```dart
    Path path = Path();
    // Adds a polygon from the starting point to quarter point of the screen and lastly
    // it will be in the bottom middle. Close method will draw a line between start and end.
    path.addPolygon([
      Offset.zero,
      Offset(size.width / 4, size.height / 4),
      Offset(size.width / 2, size.height)
    ], true);
    canvas.drawPath(path, paint);
  }
```

addpolygon_example.dart hosted with ♡ by GitHub view raw



close = true

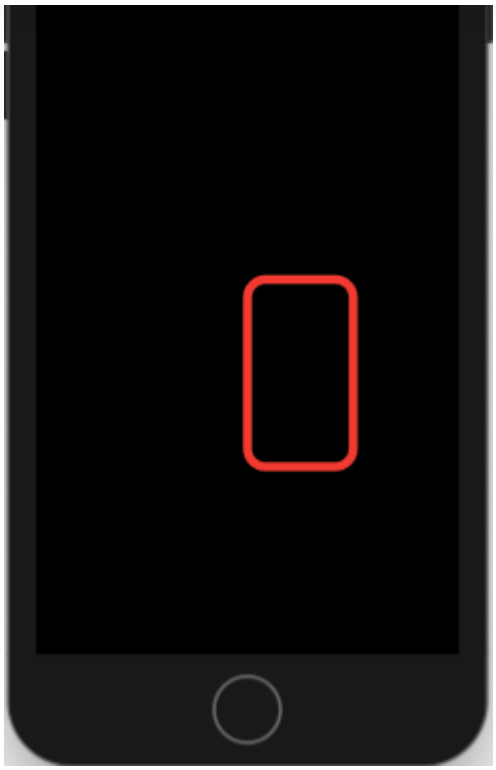
addRRect

`addRRect` is a method to create a rounded cornered rectangle. We will use the rectangle above and corners with radius of 16.

```
@override
void paint(Canvas canvas, Size size) {
  Paint paint = Paint()
    ..color = Colors.red
    ..style = PaintingStyle.stroke
    ..strokeWidth = 8.0;

  Path path = Path();
  path.addRRect(
    RRect.fromRectAndRadius(Rect.fromLTWH(size.width / 2, size.height / 2, size.width / 4, siz
  );
  canvas.drawPath(path, paint);
}
```

addRrect_example.dart hosted with ♡ by GitHub view raw



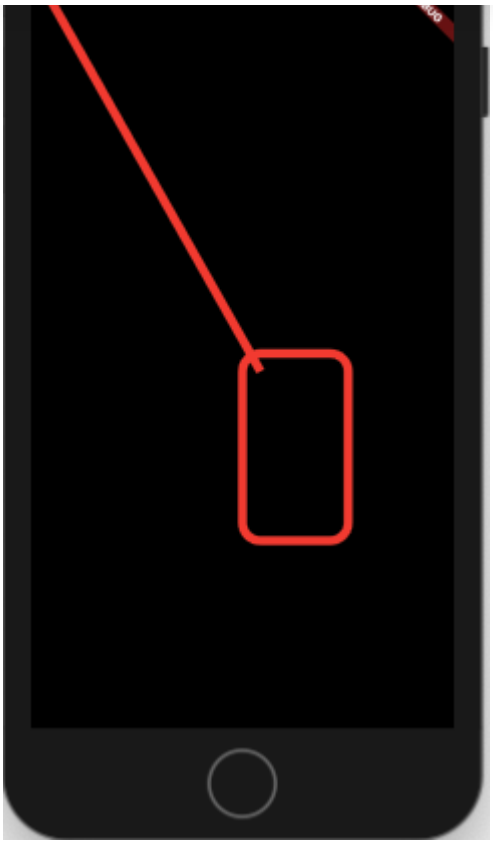
addPath

`addPath` is the method to add one path to another one with an offset. We will add one path with line to the rounded corner rectangle above.

```
@override
void paint(Canvas canvas, Size size) {
  Paint paint = Paint()
    ..color = Colors.red
    ..style = PaintingStyle.stroke
    ..strokeWidth = 8.0;

  Path path = Path();
  path.addRRect(
      RRect.fromRectAndRadius(Rect.fromLTWH(size.width / 2, size.height / 2, size.width / 4, s
  );
  Path secondPath = Path();
  secondPath.lineTo(size.width / 2, size.height / 2);
  path.addPath(secondPath, Offset(16, 16));
  canvas.drawPath(path, paint);
}
```

addpath_example.dart hosted with ♡ by GitHub view raw



relativeLineTo

`relativeLineTo` is basically behaving like `lineTo` but only offsets the drawn shape to the current point. Width the same code `lineTo` would have the half of the length.

```dart
@override
void paint(Canvas canvas, Size size) {
  Paint paint = Paint()
    ..color = Colors.red
    ..style = PaintingStyle.stroke
    ..strokeWidth = 8.0;

  Path path = Path();
  path.moveTo(size.width / 4, size.height / 4);
  path.relativeLineTo(size.width / 2, size.height / 2);
  canvas.drawPath(path, paint);
}
```

relativeLineTo_example.dart hosted with ♡ by GitHub view raw

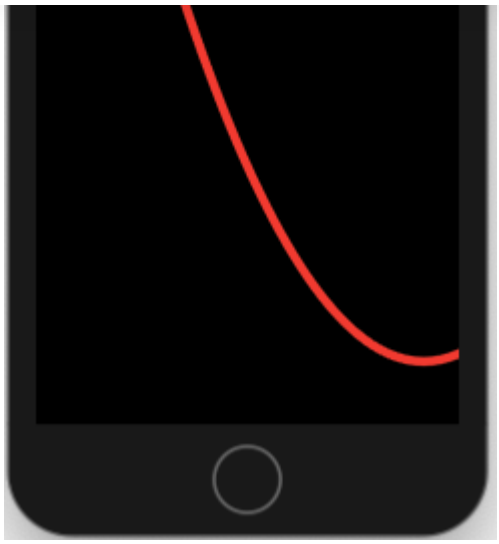
relativeQuadraticBezierTo

`relativeQuadraticBezierTo` method acts like `quadraticBezierTo` method. Current point is calculated relative to the current position of the path.

```dart
@override
void paint(Canvas canvas, Size size) {
  Paint paint = Paint()
    ..color = Colors.red
    ..style = PaintingStyle.stroke
    ..strokeWidth = 8.0;

  Path path = Path();
  path.moveTo(size.width / 4, size.height / 4);
  path.relativeQuadraticBezierTo(size.width / 2, size.height, size.width, size.height / 2);
  canvas.drawPath(path, paint);
}
```

relativeQuadraticBezierTo_example.dart hosted with ♡ by GitHub view raw



relativeConicTo

`relativeConicTo` behaves exactly like `conicto` method. It calculates the current point relative to the path's current position.

```dart
@override
void paint(Canvas canvas, Size size) {
  Paint paint = Paint()
    ..color = Colors.red
    ..style = PaintingStyle.stroke
    ..strokeWidth = 8.0;

  Path path = Path();
  path.moveTo(size.width / 4, size.height / 4);
  path.relativeConicTo(size.width / 4, 3 * size.height / 4, size.width, size.height, 20);
  canvas.drawPath(path, paint);
}
```

relativeConicTo_example.dart hosted with ♡ by GitHub view raw

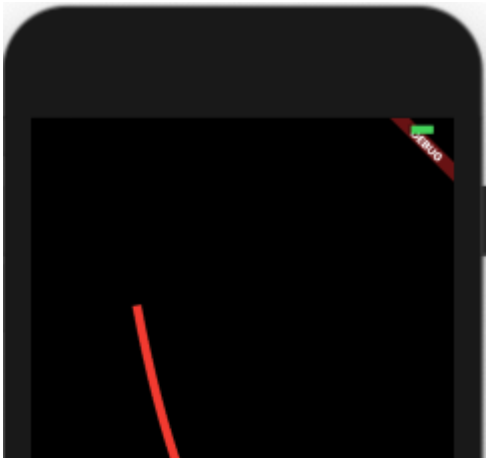
relativeCubicTo

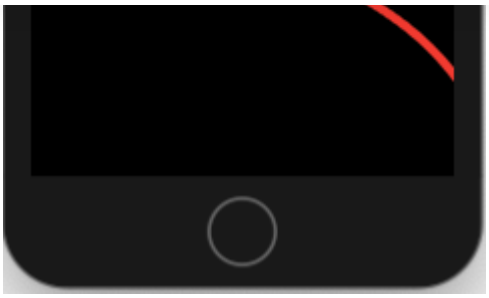
`relativeCubicTo` method behaves exactly like `cubicTo`. Only difference is, it's current position will be calculated relative to the current position of the path.

```dart
@override
void paint(Canvas canvas, Size size) {
  Paint paint = Paint()
    ..color = Colors.red
    ..style = PaintingStyle.stroke
    ..strokeWidth = 8.0;

  Path path = Path();
  path.moveTo(size.width / 4, size.height / 4);
  path.relativeCubicTo(size.width / 4, 3 * size.height / 4, 3 * size.width / 4, size.height /
  canvas.drawPath(path, paint);
}
```

relativeCubicTo_example.dart hosted with ♡ by GitHub view raw





Conclusion

Drawing custom shapes with canvas are really important and it's helpful for us to use our creativity in our application development. These operations can be used to create a cool background, graphics and so on.
So, go ahead and play around with it, if you have any questions either leave a comment below or send me a DM over Twitter (you can find the link below).

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