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3rd Year (6th semester)

Experiment No: 4

AIM: To create Flutter charts with charts_flutter

THEORY:

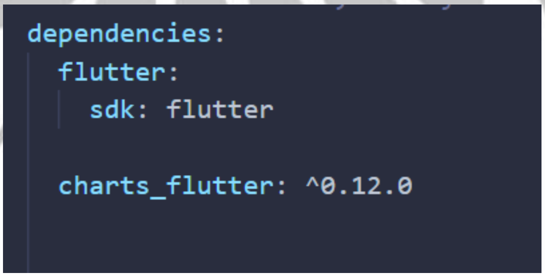
Flutter Charts:

Charts within applications provide graphical displays or pictorial representations of data, spanning industries and apps. Mobile applications like Mint use pie charts to monitor spending habits and fitness apps like Strava use line charts and bar charts for analyzing pacing, heart rate, and elevation gain.

When building Flutter apps, developers can use the official charts_flutter library, maintained by Google, to create these types of charts.

Create and set up a Flutter project with charts_flutter:

1. To create a new Flutter project, run the following command: flutter create projectName
2. To import chart_flutter into your project, open the pubspec.yaml file and add it under dependencies:

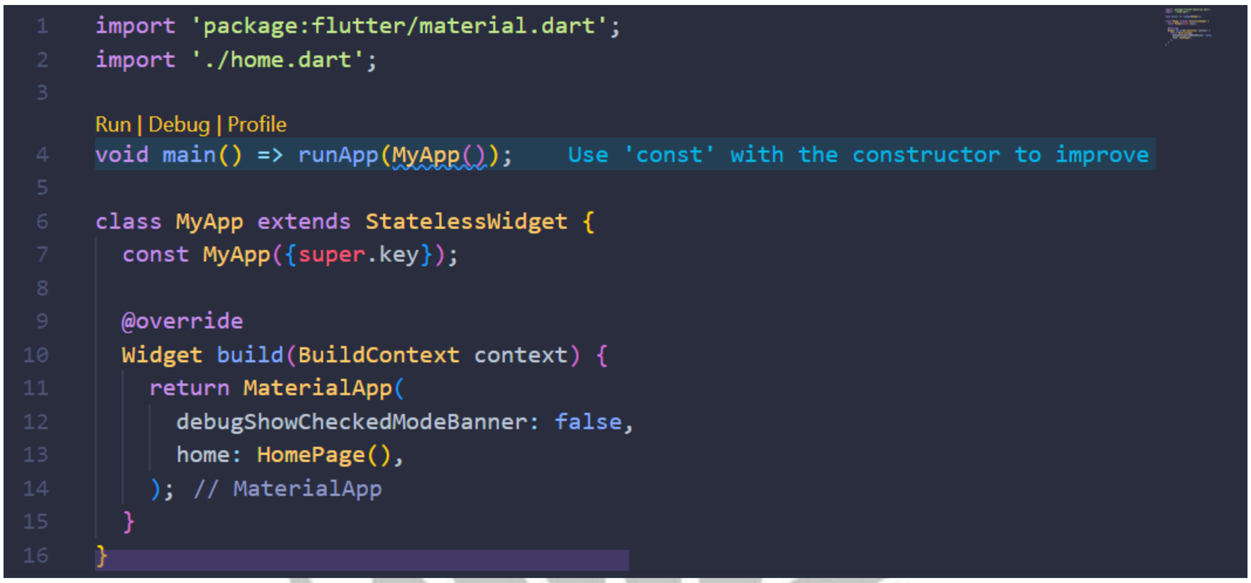


```
dependencies:
  flutter:
    sdk: flutter

  charts_flutter: ^0.12.0
```

Scaffolding the app

Now we have the basic code that comes with new Flutter apps: a counter that keeps a record of how many times a button is pushed.

Since we don't need that in our bar chart app, go ahead and delete that code found in the main.dart page. Delete everything except the following:

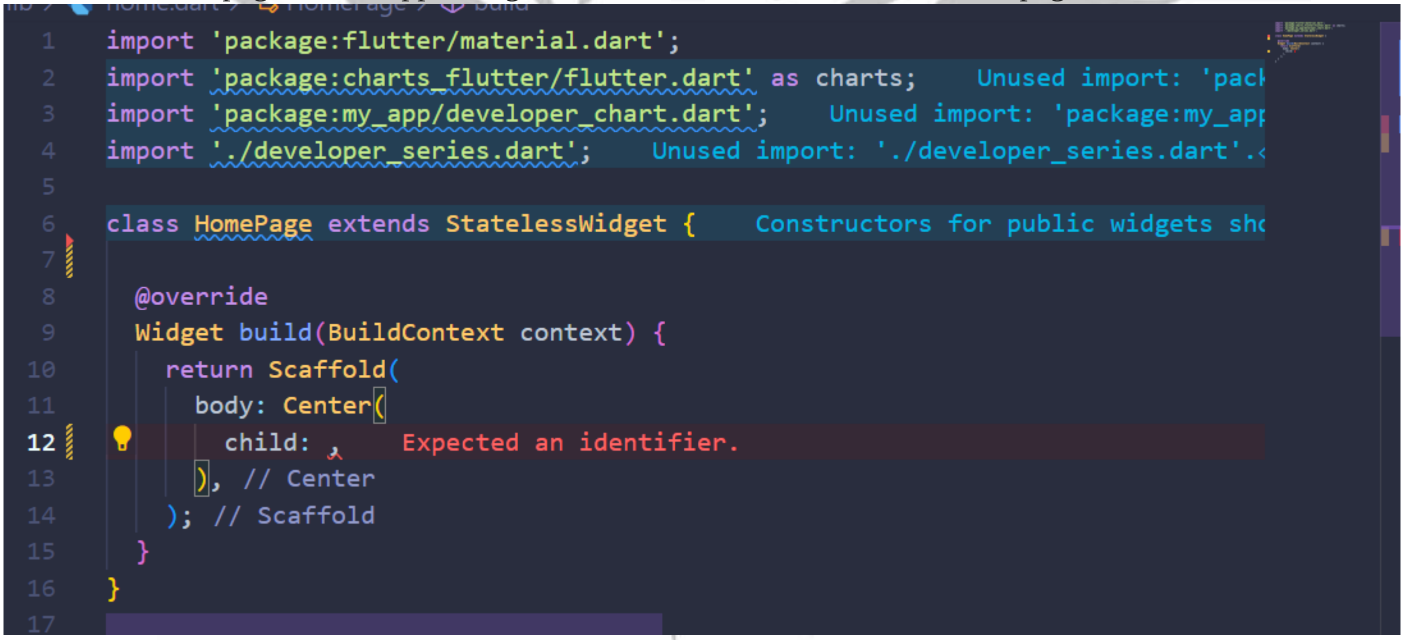


```
import 'package:flutter/material.dart';
import './home.dart';

Run | Debug | Profile
void main() => runApp(MyApp());    Use 'const' with the constructor to improve

class MyApp extends StatelessWidget {
  const MyApp({super.key});

  @override
  Widget build(BuildContext context) {
    return MaterialApp(
      debugShowCheckedModeBanner: false,
      home: HomePage(),
    ); // MaterialApp
  }
}
```

Now, return the MaterialApp class in our build widget so we can use Material Design.

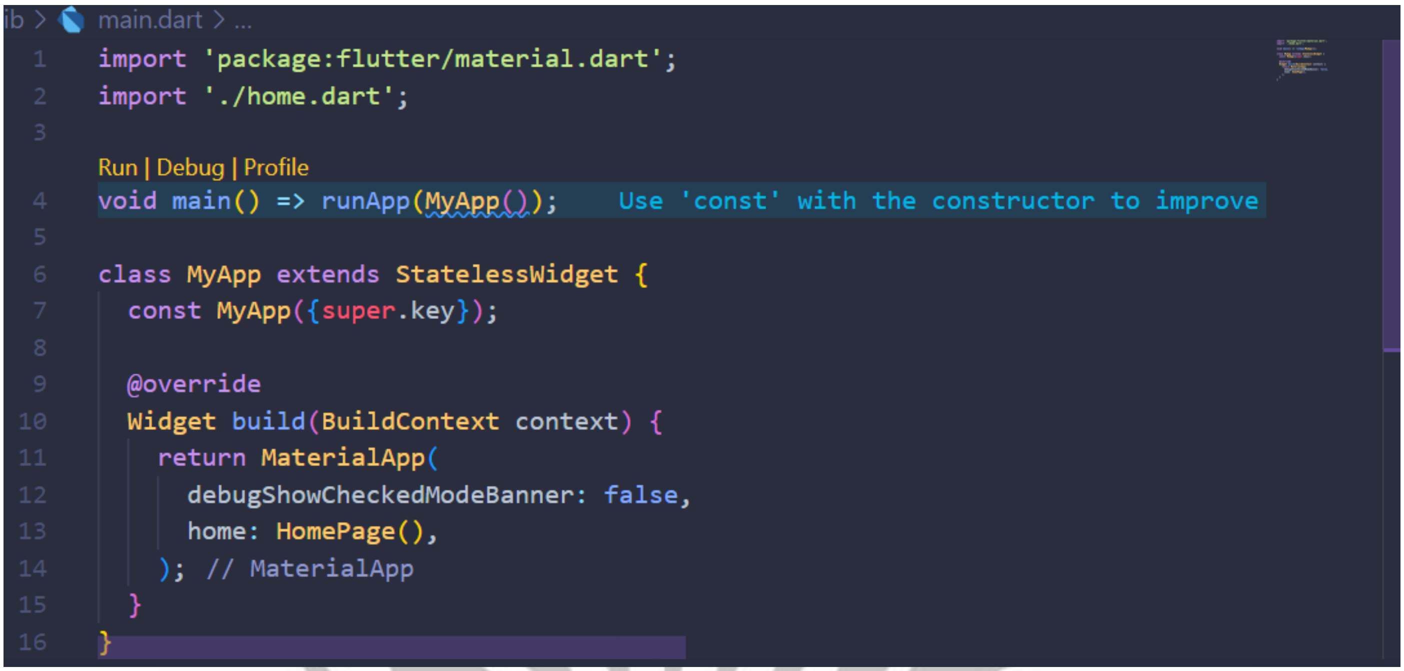
Creating a homepage

To create a homepage for our app, navigate into the lib folder and create a new page named home.dart:



```
import 'package:flutter/material.dart';
import 'package:charts_flutter/flutter.dart' as charts;    Unused import: 'pack
import 'package:my_app/developer_chart.dart';    Unused import: 'package:my_app
import './developer_series.dart';    Unused import: './developer_series.dart'.

class HomePage extends StatelessWidget {    Constructors for public widgets sho

  @override
  Widget build(BuildContext context) {
    return Scaffold(
      body: Center(
        child: ,     Expected an identifier.
      ), // Center
    ); // Scaffold
  }
}
```

With import 'package:flutter/material.dart', we can then import Material Design.
Then, the HomePage class extends the statelessWidget, as no states change on this page.
Inside the BuildContext widget, we return the Scaffold class to give us a basic Material Design layout structure. Our bar chart will go where the child parameter is, and we will center it on the body of our screen. All of this now serves as the scaffold for our app. loads.



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

Run | Debug | Profile
void main() => runApp(MyApp());    Use 'const' with the constructor to improve

class MyApp extends StatelessWidget {
  const MyApp({super.key});

  @override
  Widget build(BuildContext context) {
    return MaterialApp(
      debugShowCheckedModeBanner: false,
      home: HomePage(),
    ); // MaterialApp
  }
}
```

With the homepage complete, we can specify HomePage in our main.dart file since main.dart brings all the features in our app together. With this code, main.dart knows which page to show first whenever the app

Creating a Flutter chart app

Series and models

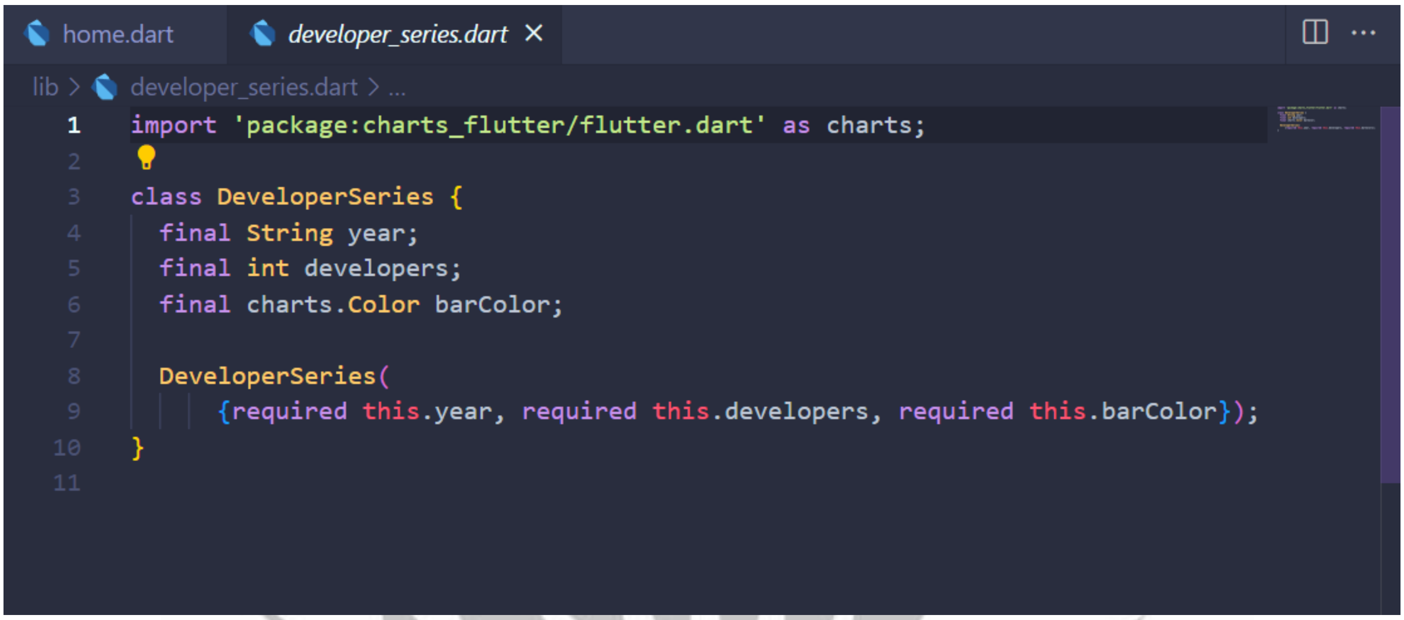
The two terms commonly used with Flutter charts: series and models.

A series is a group (or series) of information that we can use to plot our chart. A model is the format our information comes in that specifies the attributes every data item using the model must have.

Creating a bar chart : Creating a model for bar chart data

To begin, we'll create a bar chart to show the number of new fictional Flutter chart developers that were added over the past five years. In other words, we want to track the growth the fictional Flutter chart community.

Our model, which defines the format of our data, consists of the year we are looking at, the number of developers that joined the Flutter chart community that year, and the color of the corresponding bar. Inside the `lib` folder, create a file named `developer_series.dart`. Below, implement the code for our model:


home.dart developer_series.dart
lib > developer_series.dart > ...

```dart
import 'package:charts_flutter/flutter.dart' as charts;

class DeveloperSeries {
  final String year;
  final int developers;
  final charts.Color barColor;

  DeveloperSeries(
      {required this.year, required this.developers, required this.barColor});
}

```

We named the model `DeveloperSeries` and specified the properties that each series item must have (`year`, `developers`, and `barColor`).

To prevent the parameter of a class from being null when creating an object of the class, we use the `@required` annotation, as seen in the code block above.

To use the `@required` keyword, we must import the `foundation.dart` package.

Creating data for a bar chart

Now that we have a model for our bar chart data, let's proceed to actually create some data. In the homepage, generate data for the bar chart by adding the following:

```dart
import 'package:flutter/material.dart';
import 'package:charts_flutter/flutter.dart' as charts;
import 'package:my_app/developer_chart.dart';
import './developer_series.dart';

class HomePage extends StatelessWidget {
  final List<DeveloperSeries> data = [
    DeveloperSeries(
      year: "2017",
      developers: 40000,
      barColor: charts.ColorUtil.fromDartColor(Colors.green),
    ),
    DeveloperSeries(
      year: "2018",
      developers: 5000,
      barColor: charts.ColorUtil.fromDartColor(Colors.green),
    ),
    DeveloperSeries(
      year: "2019",
      developers: 40000,
      barColor: charts.ColorUtil.fromDartColor(Colors.green),
    ),
    DeveloperSeries(
      year: "2020",
      developers: 35000,
      barColor: charts.ColorUtil.fromDartColor(Colors.green),
    ),
    DeveloperSeries(
      year: "2021",
      developers: 45000,
      barColor: charts.ColorUtil.fromDartColor(Colors.green),
    ),
  ];

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

This is a simple list named data. Each item in the list is modeled after the DeveloperSeries model, meaning each item has a year (year), number of developers (developers), and bar color (barColor) property.

Building the bar chart

We've successfully created the data for our bar chart. Now, let's create the bar chart itself. To make our project organized, we'll put the code for our bar chart in a separate file.

Inside `lib`, create a `developer_chart.dart` file:

```
import 'package:flutter/material.dart';
import 'package:charts_flutter/flutter.dart' as charts;
import './developer_series.dart';

class DeveloperChart extends StatelessWidget {
  final List<DeveloperSeries> data;
  DeveloperChart({required this.data});
  @override
  Widget build(BuildContext context) {
    List<charts.Series<DeveloperSeries, String>> series = [
      charts.Series(
          id: "developers",
          data: data,
          domainFn: (DeveloperSeries series, _) => series.year,
          measureFn: (DeveloperSeries series, _) => series.developers,
          colorFn: (DeveloperSeries series, _) => series.barColor)
    ];

    return charts.BarChart(series, animate: true);
  }
}
```

With final List<DeveloperSeries> data, we defined a list called data, which is a List of data items in the form of our DeveloperSeries model we created earlier.
Every data item on the list comes with a corresponding year, number of developers, and bar color.

The DeveloperChart constructor inside the class ensures that everywhere the bar chart class is used, the data it requires is always provided; this is done using the @required keyword.

The actual bar chart is created inside our build widget. As you know, all bar charts have groups of data plotted against each other (in our case, the last five years and the number of developers the Flutter chart community gained).

Together, these groups of data are known as a series. The series tells us Flutter which group of data to put on the horizontal side and which group to put on the vertical side of our bar chart.

The list of data we created earlier then inserts into our series and used appropriately by Flutter.

With List<charts.Series<DeveloperSeries, String>> series, we created a list named series. This list has a type of charts.Series; charts imports Flutter into our project and the Series function creates series for a bar chart in Flutter.

The series we just created is modeled after our DeveloperSeries model.

The parameters we'll be specifying inside our series include id, data, domainFn, measureFn, and colorFN:

- id identifies the chart
- data points to the list of items to plot on the bar chart
- domainFn points to the values that will be on the horizontal side of the bar chart
- measureFn points to the quantity of the values on the vertical side

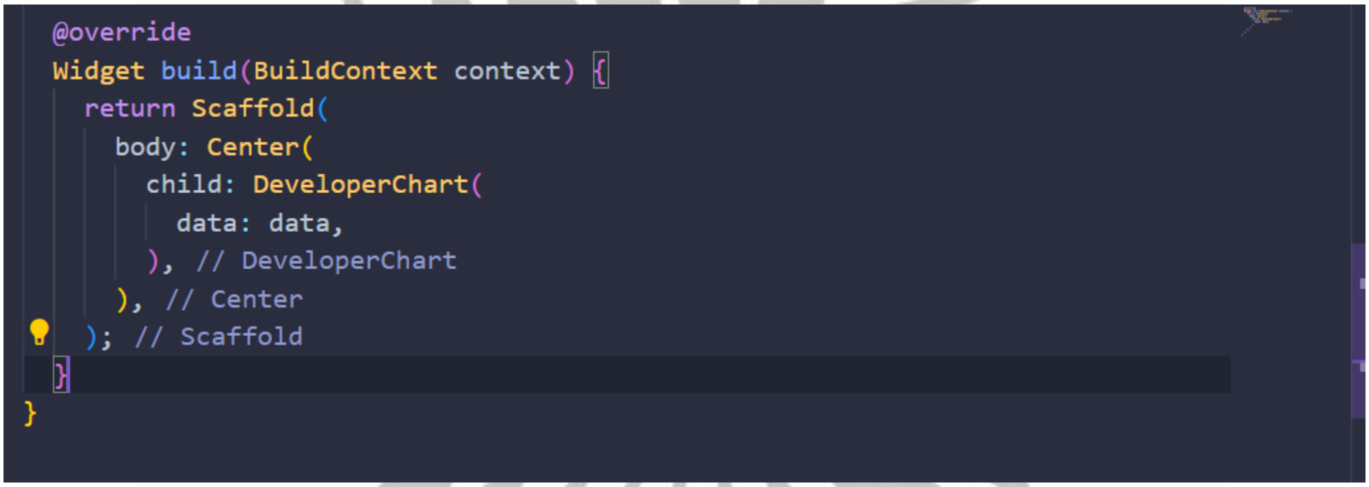
- colorFN refers to the color of the bars

With the domainFn, measureFn, and colorFN functions, we create functions that take the Subscriber series as an argument, create instances of it, and then use the instances to access its different properties.

The underscores in the developer_chart.dart file signify that the second arguments are not required.

After pointing our series to all the data it requires, we then use it to create our bar chart using Flutter's BarChart function.
We can also add an animation for visual appeal by simply setting animate to true, which renders the chart with a nice animation.
Adding the bar chart to the homepage

Now, we can add our newly created bar chart to our homepage and display it:



```
  @override
  Widget build(BuildContext context) {
    return Scaffold(
      body: Center(
        child: DeveloperChart(
          data: data,
        ), // DeveloperChart
      ), // Center
    ); // Scaffold
  }
}
```

Here, we simply call the DeveloperChart class inside the body of our page and point it to the data we want to use. To ensure our chart fits well on a screen, we'll put it in a Card, wrap a container around it, and give it a set height and some padding:

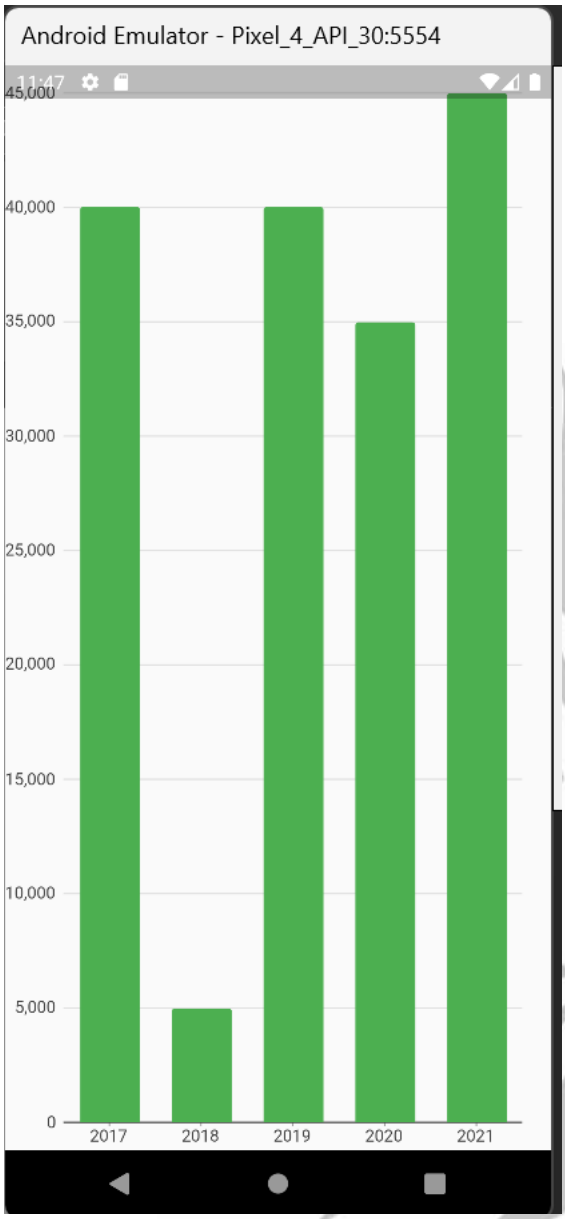
```
import 'package:flutter/material.dart';
import 'package:charts_flutter/flutter.dart' as charts;
import './developer_series.dart';

class DeveloperChart extends StatelessWidget {
  final List<DeveloperSeries> data;

  DeveloperChart({required this.data});
  @override
  Widget build(BuildContext context) {
    List<charts.Series<DeveloperSeries, String>> series = [
      charts.Series(
          id: "developers",
          data: data,
          domainFn: (DeveloperSeries series, _) => series.year,
          measureFn: (DeveloperSeries series, _) => series.developers,
          colorFn: (DeveloperSeries series, _) => series.barColor)
    ];

    return charts.BarChart(series, animate: true);
  }
}
```

By using the `expanded` widget, we expanded our bar chart nicely into the `Card`. The `Text` widget above it gives our bar chart a title to let people know what it's about.

And, with `Theme.of(context).textTheme.body2`, we applied Material Design's default style for the body text to our title.

With `padding: const EdgeInsets.all(9.0)`, we gave the card holding our bar chart padding of 9 px on all sides. Lastly, we wrapped the `Card` in a container and gave the container a height of 300 px and padding of 25 px on all sides.

Now, our bar chart should render nicely on our screen.



Conclusion: - Hence we have successfully added Flutter charts.