

# Widget & Flutter Deep Dive

Behind The Scenes &  
Beyond the Basics

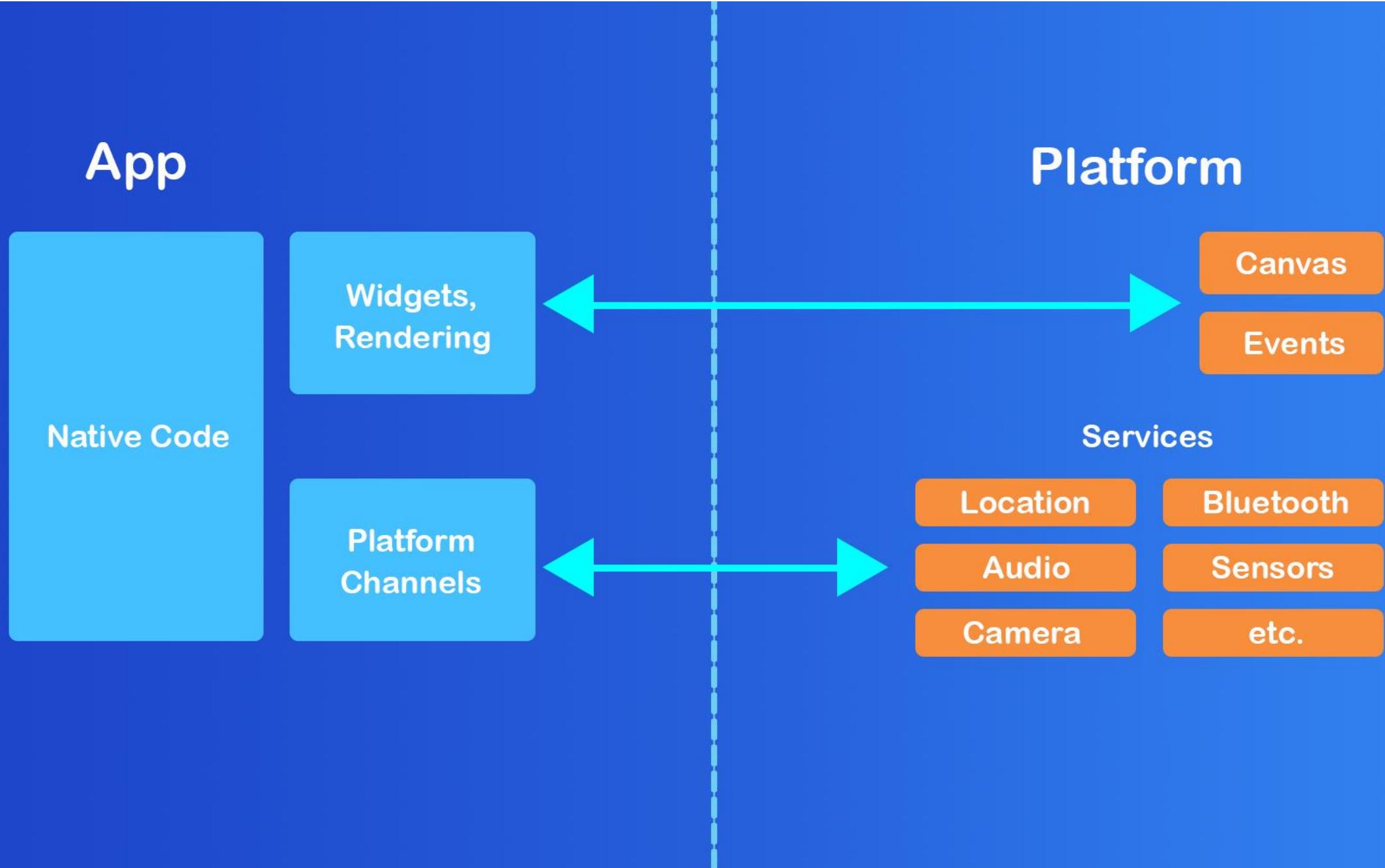
# What's In This Section?

How Flutter Works Under The Hood

Writing Good Flutter Code

Advanced Flutter & Dart Features

# **THE PROBLEM AT HAND**



- Flutter does not use the OEM widgets, it provides its own widgets.
- Flutter moves the widgets and the renderer from the **Platform** into the app, which allows them to be customizable and extensible.
- This also helps Flutter to maintain the consistent **60 FPS**

# **WIDGET TREE AND ELEMENT TREE – WHAT, WHY, AND HOW**

# Widget Tree & Element Tree

Widget Tree

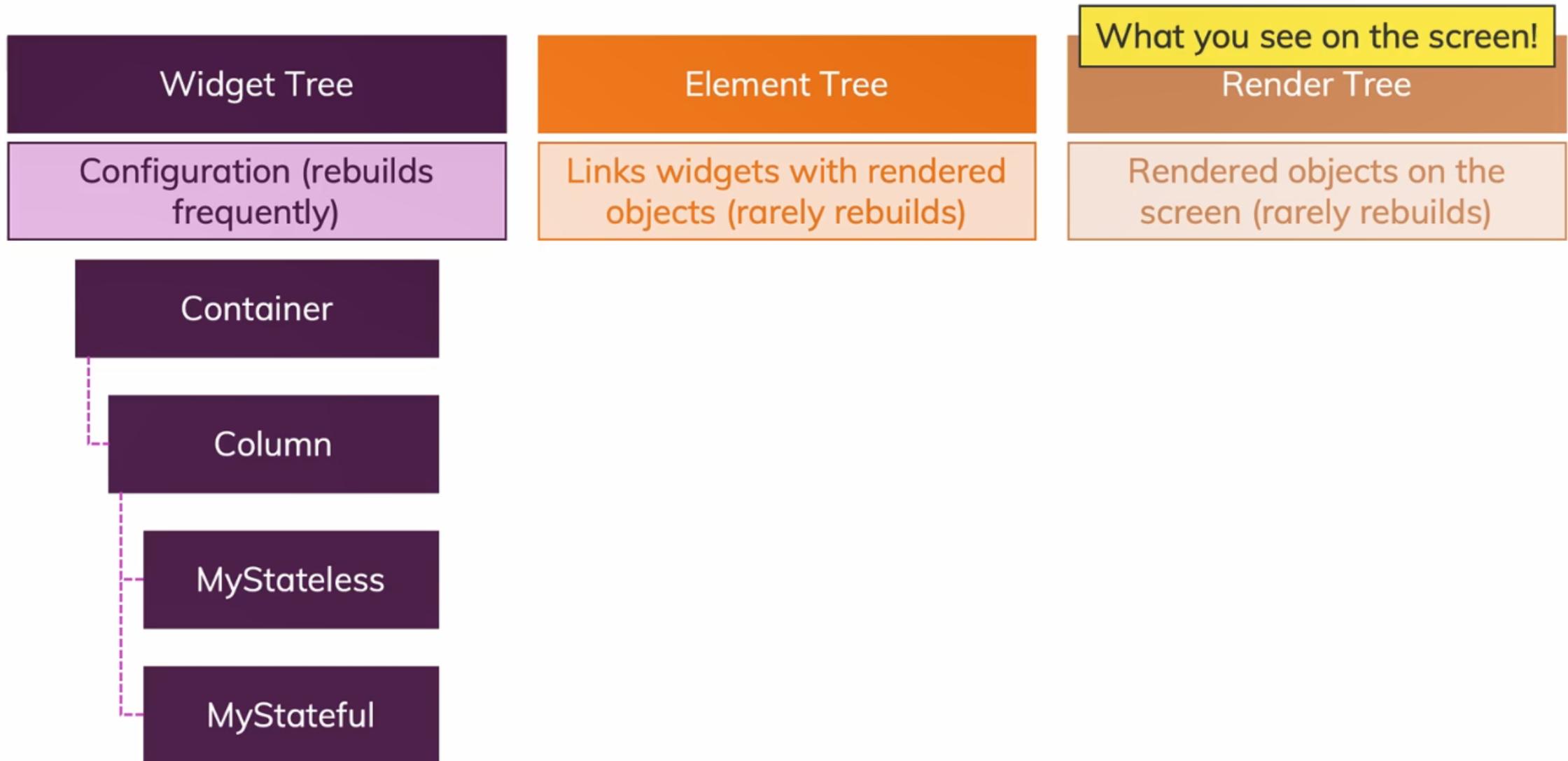
Element Tree

Render Tree

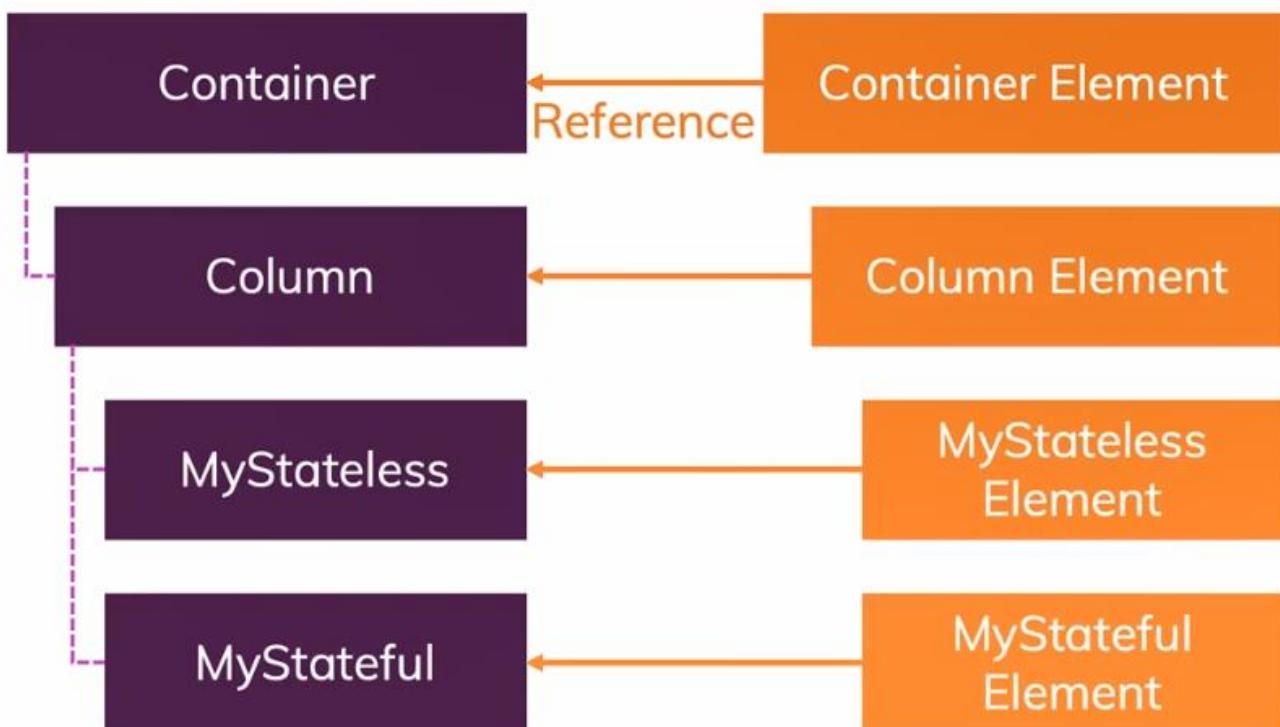
# Widget Tree & Element Tree



# Widget Tree & Element Tree

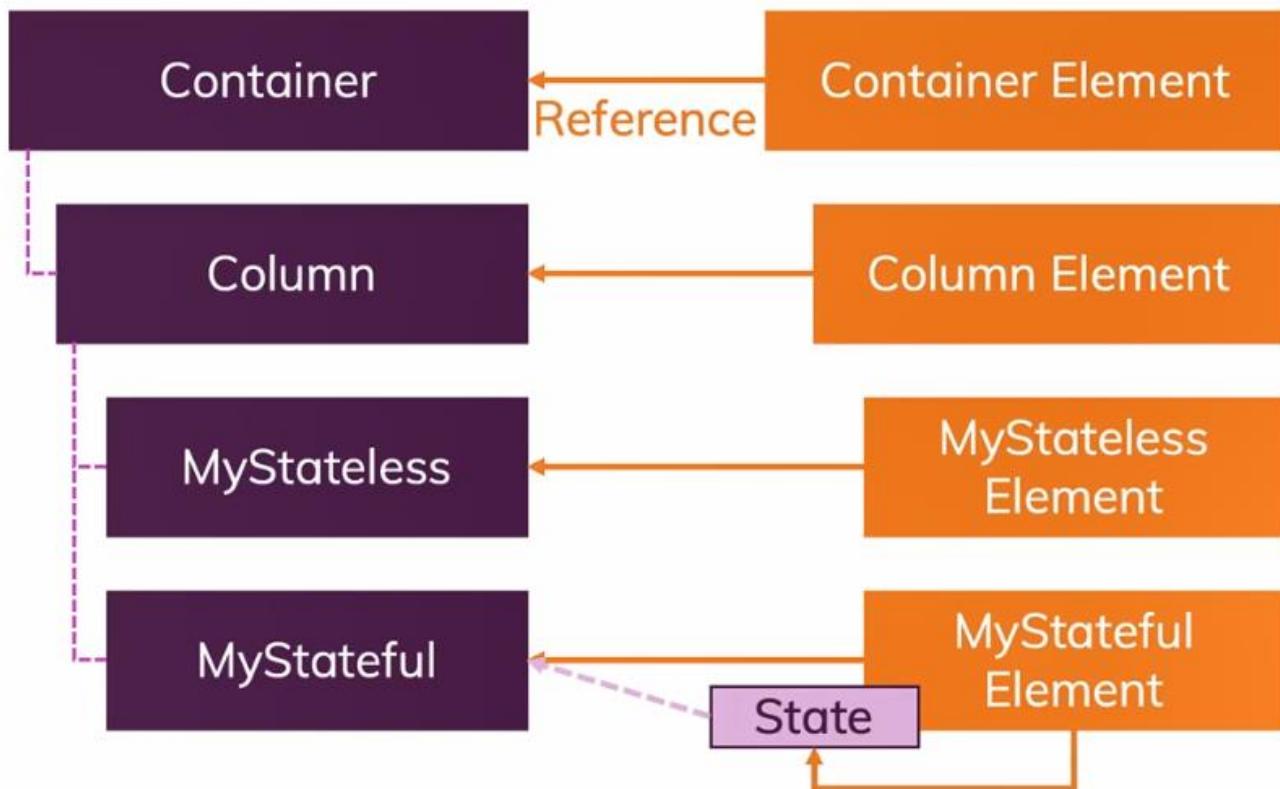


# Widget Tree & Element Tree

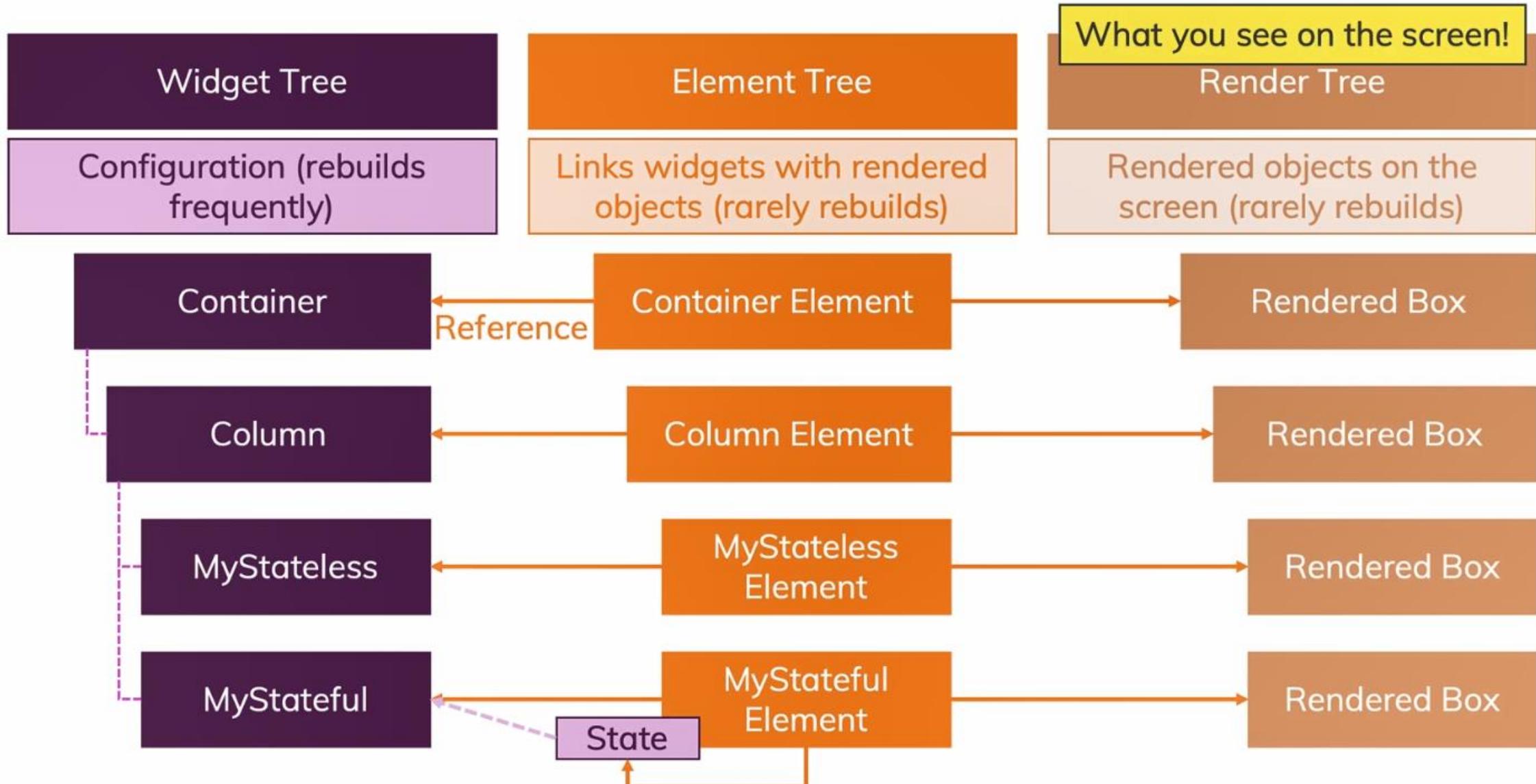


# Widget Tree & Element Tree

Widget Tree	Element Tree	What you see on the screen!
Configuration (rebuids frequently)	Links widgets with rendered objects (rarely rebuilds)	Render Tree Rendered objects on the screen (rarely rebuilds)



# Widget Tree & Element Tree



The screenshot shows the Flutter DevTools interface with the "Flutter Inspector" tab selected. The left sidebar displays the widget tree structure of the application, starting from the root and navigating through MyApp, MaterialApp, Scaffold, SafeArea, SingleChildScrollView, Column, Container, Chart, Card, Padding, Row, Flexible, ChartBar, LayoutBuilder, Column, Container, and FittedBox. The right panel, titled "Layout Explorer", provides detailed information about the selected FittedBox widget. It lists properties such as fit: contain, alignment: Alignment.center, dependencies: [Directionality], renderObject: RenderFittedBox#... (with a relayoutBoundary=up4), parentData: <none> (can use size), constraints: BoxConstraints(0.0<=w<=50.2, h=18.2), size: Size(18.2, 18.2), fit: contain, alignment: Alignment.center, textDirection: ltr, and a nested Text widget with the value "\$0", textAlign: null, textDirection: null, locale: null, and softWrap: null. Navigation tabs at the top of the right panel include Slow Animations, Show Guidelines, Show Baselines, Highlight Repaints, and Highlight Oversized Images. Buttons for "Expand all" and "Collapse to selected" are also present. The bottom section, "Console", shows log entries related to Stack, FractionallySizedBox, FittedBox, and Eval, along with their file paths and line numbers. The status bar at the bottom indicates the platform as ia32-32 android.

Pros and Cons of Flutter App Dev X Flutter DevTools

127.0.0.1:9101/#/?hide=debugger&ide=VSCode&theme=dark&uri=http%3A%2F%2F127.0.0.1%3A52209%2FDB4oJVxKEjA%3D%2F

Flutter DevTools

Flutter Inspector Performance CPU Profiler Memory Network Logging App Size ⚡ ⚡ ⚡ ⚡ ⚡ ⚡ ⚡

Select Widget Mode Refresh Tree

[root] MyApp MaterialApp MyHomePage Scaffold SafeArea SingleChildScrollView Column Container Chart Card Padding Row Flexible ChartBar LayoutBuilder Column Container FittedBox

Slow Animations Show Guidelines Show Baselines Highlight Repaints Highlight Oversized Images

Layout Explorer Details Tree

FittedBox

- fit: contain
- alignment: Alignment.center
- dependencies: [Directionality]

renderObject: RenderFittedBox#c2ca7 relayoutBoundary=up4

- parentData: <none> (can use size)
- constraints: BoxConstraints(0.0<=w<=50.2, h=18.2)
- size: Size(18.2, 18.2)
- fit: contain
- alignment: Alignment.center
- textDirection: ltr

Text

- "\$0"
- textAlign: null
- textDirection: null
- locale: null
- softWrap: null

Expand all Collapse to selected

Console

Stack chart\_bar.dart:28:22

FractionallySizedBox chart\_bar.dart:37:19

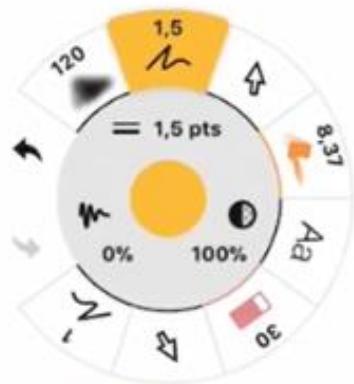
FittedBox chart\_bar.dart:18:22

Eval

flutter.dev/devtools/inspector ia32-32 android

# HOW FLUTTER REBUILDS AND REPAINTS THE SCREEN

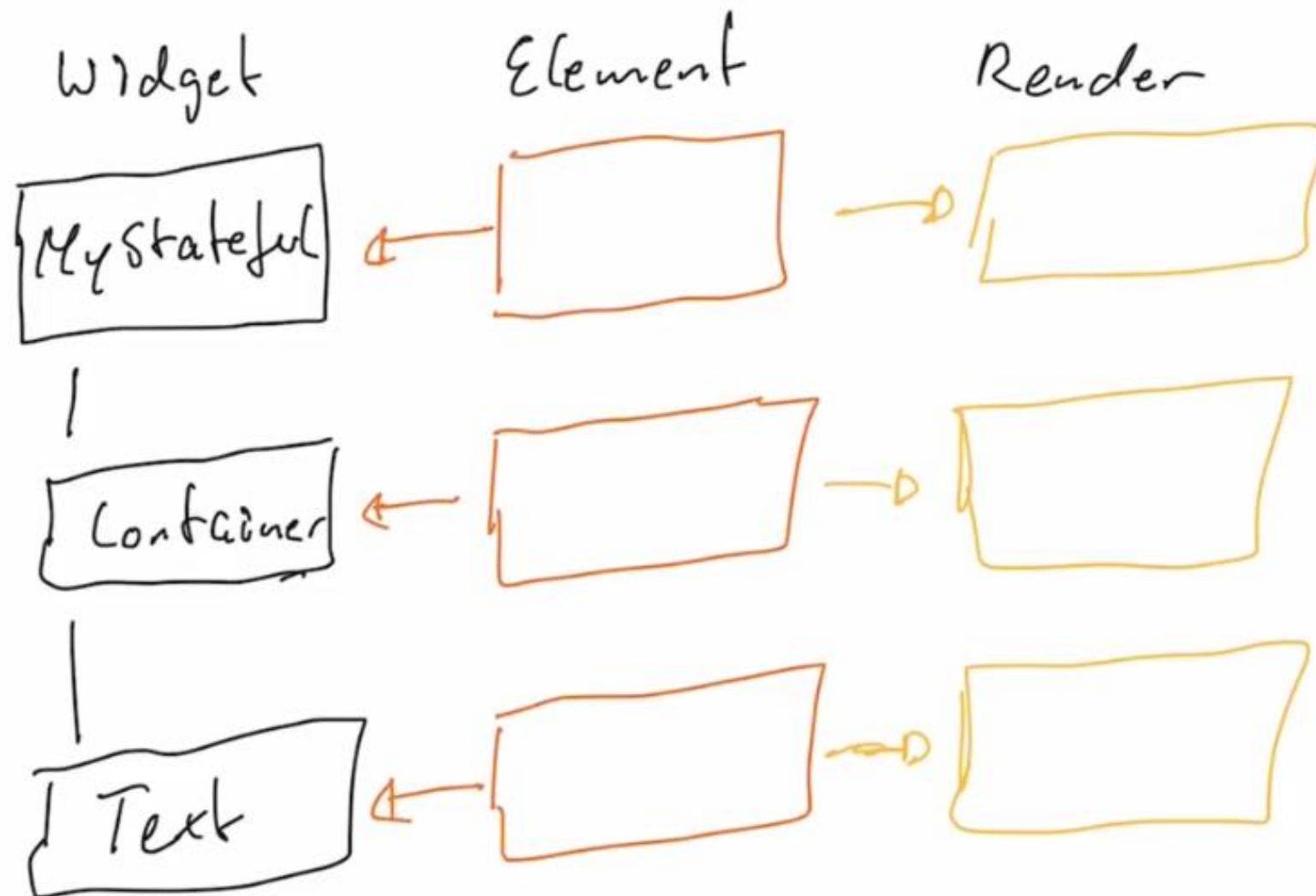
☰ Precision



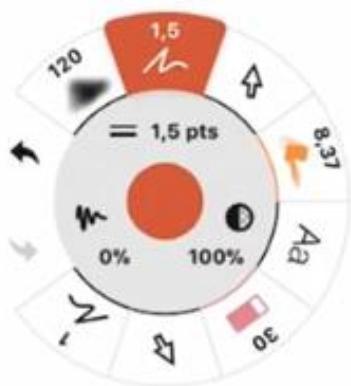
☰ Layers

Export ↑

Import ↓



Precision



Layers

MyStateful

Widget

~~My stateful~~

Element

Render

setState()

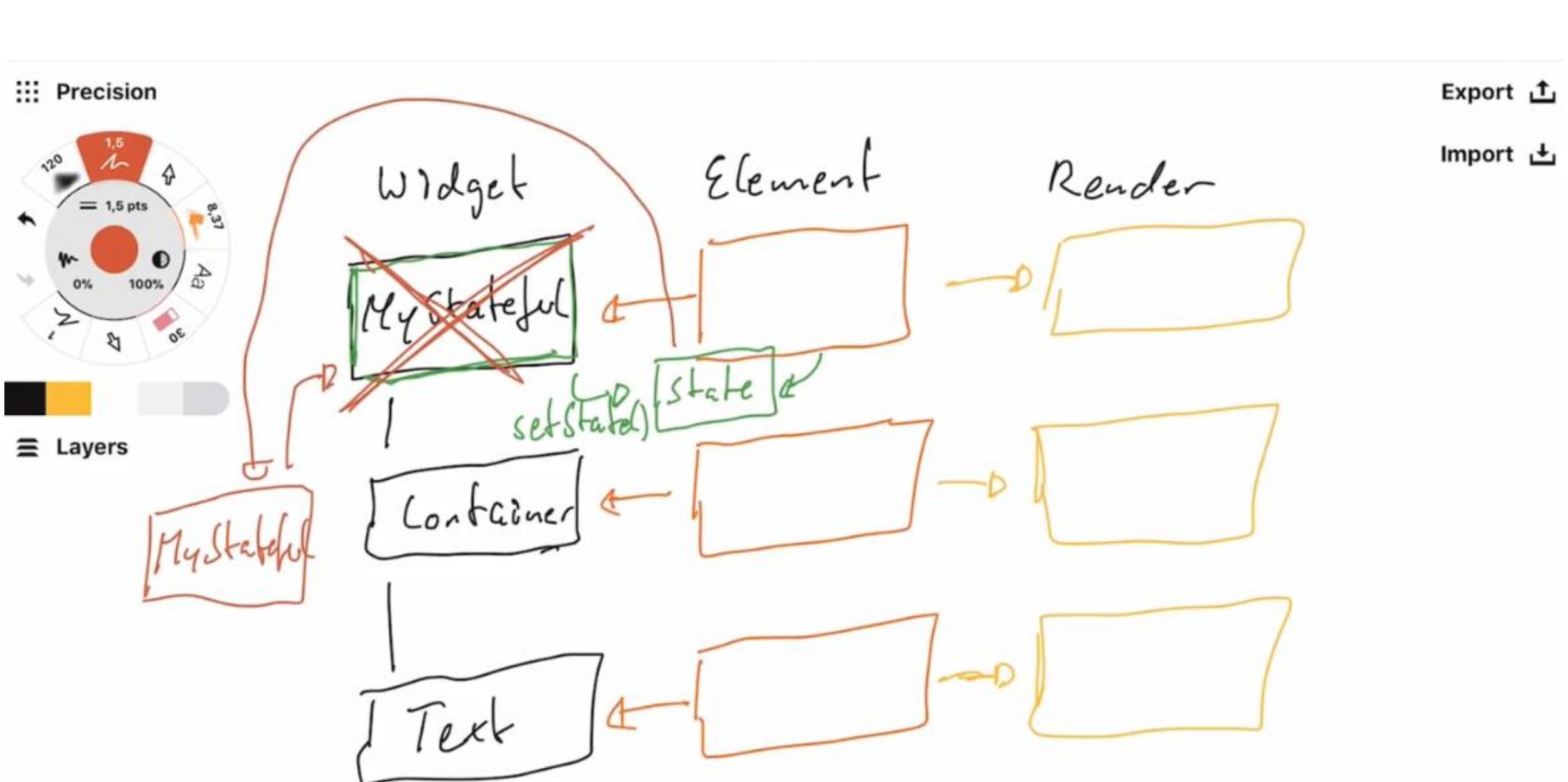
state

Container

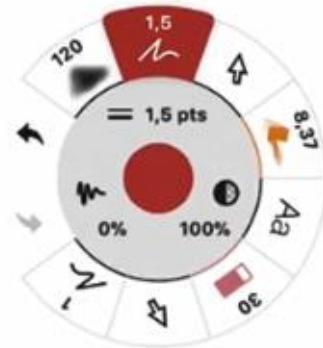
Text

Export ↑

Import ↓

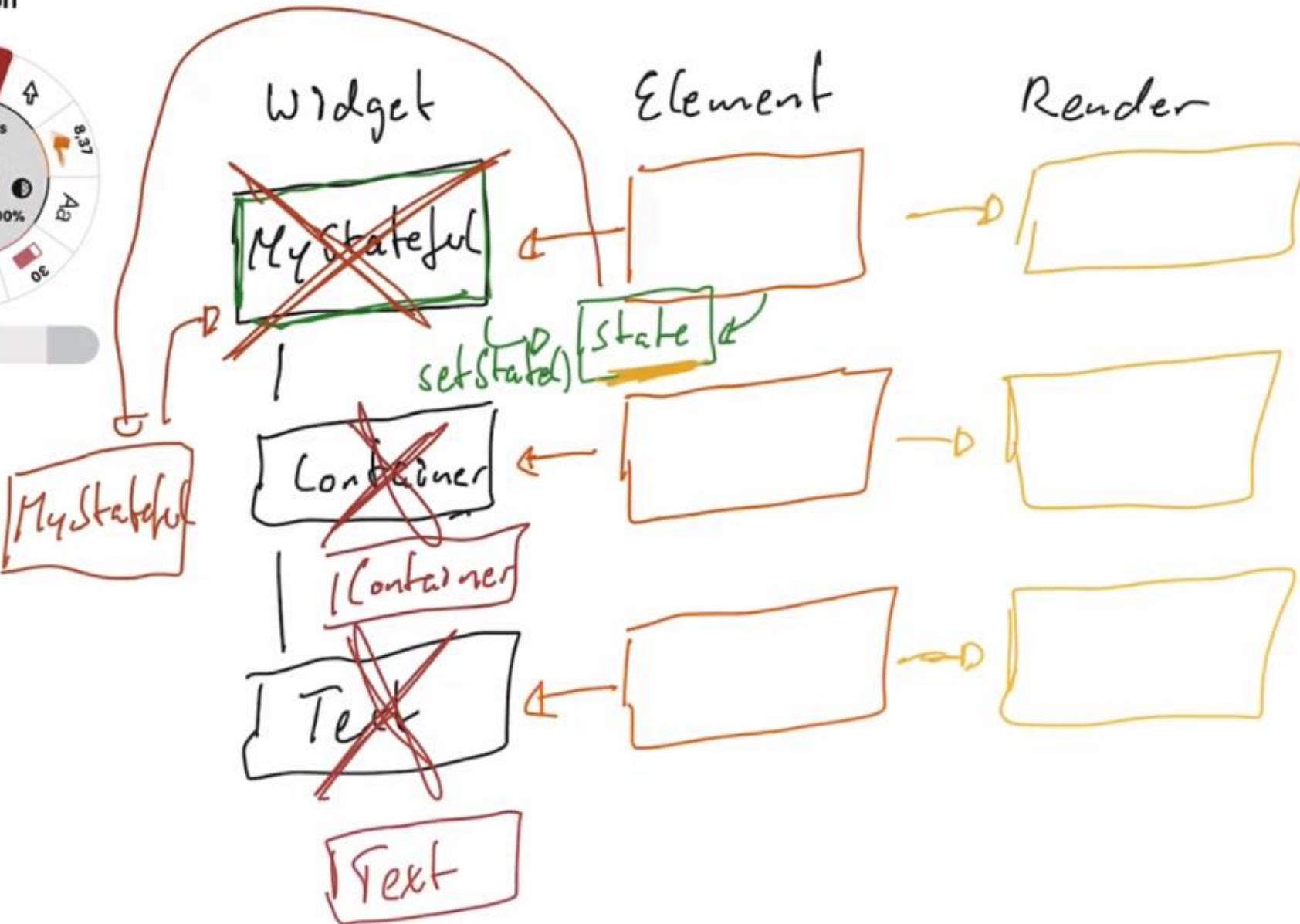


Precision



Layers

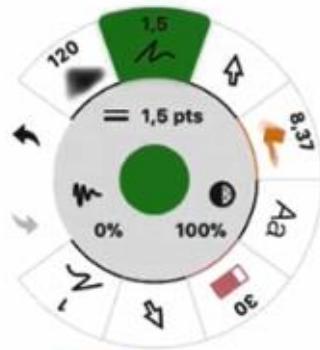
~~MyStateful~~



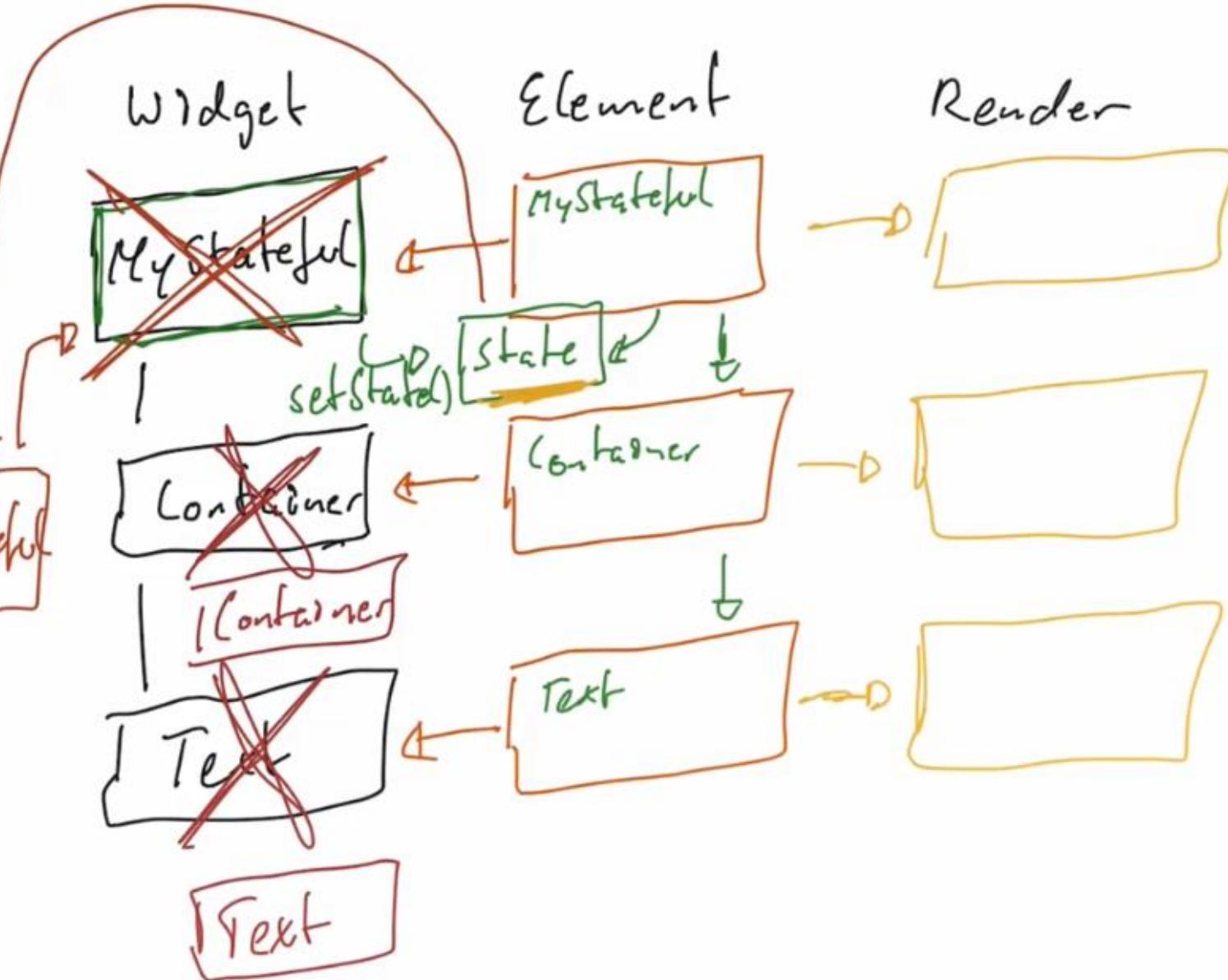
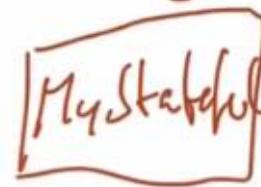
Export ↑

Import ↓

Precision



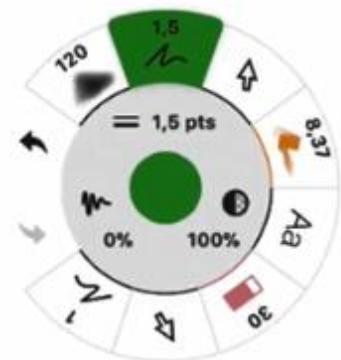
Layers



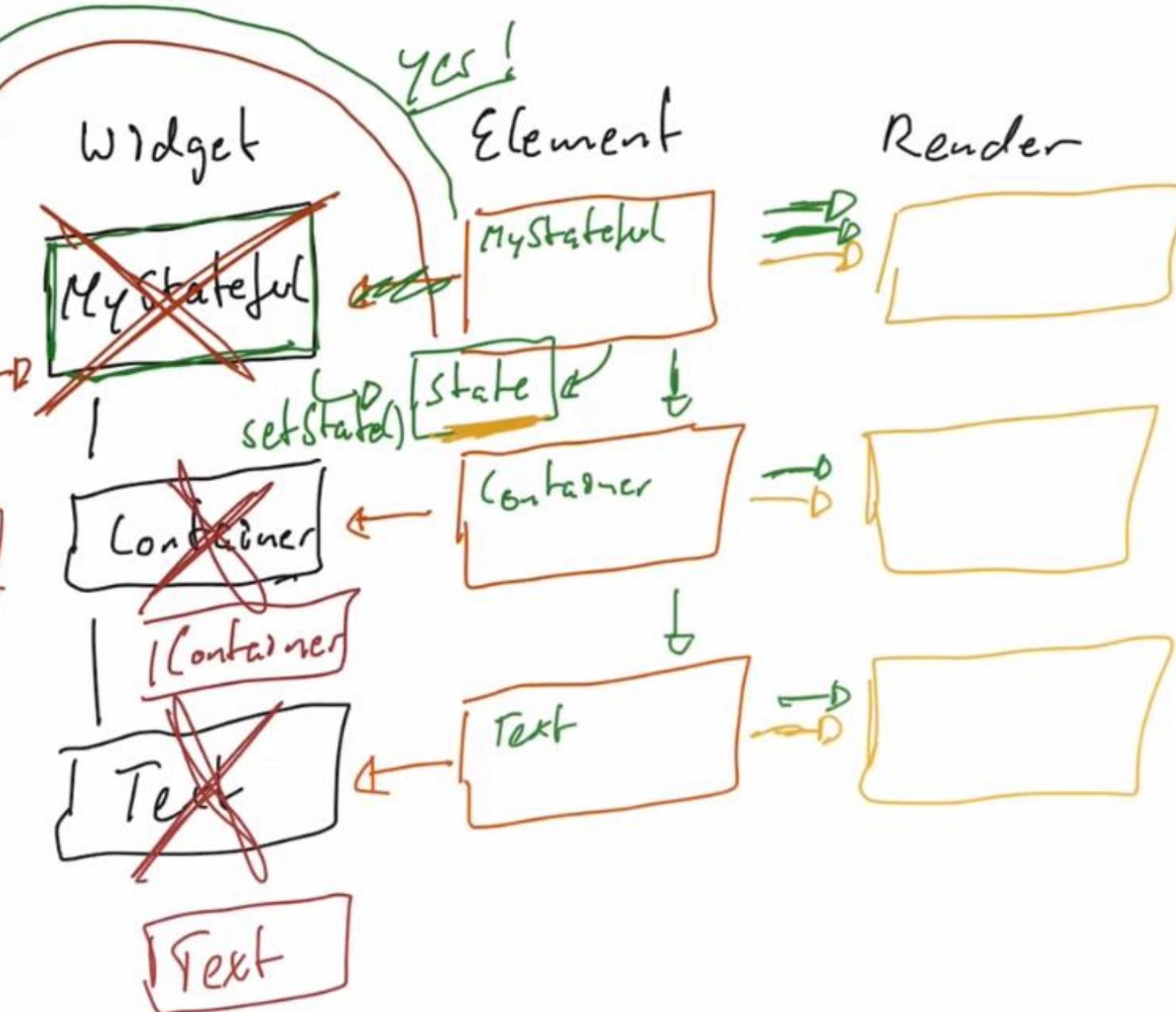
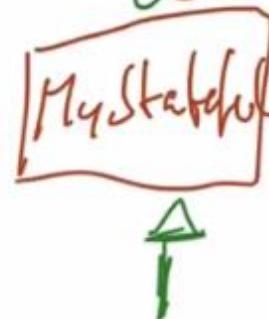
Export ↑

Import ↓

Precision



Layers



Export ↑

Import ↓

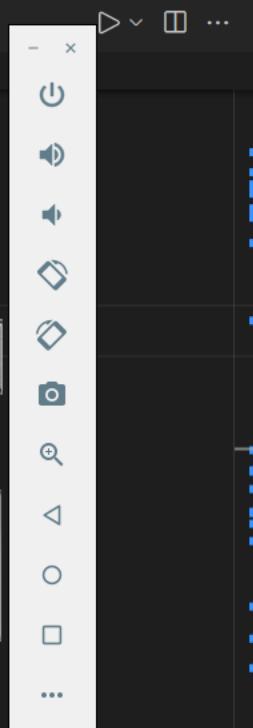
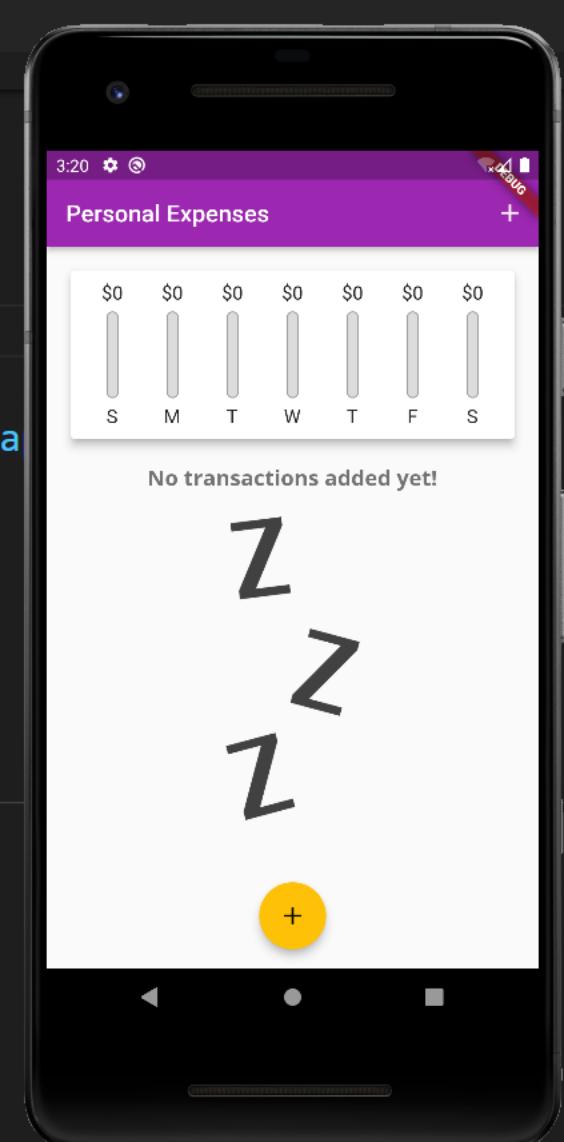
# HOW FLUTTER EXECUTES BUILD()

main.dart X chart\_bar.dart chart.dart adaptive\_flat\_button.dart lib > main.dart > \_MyHomePageState > build

```
118 }  
119  
120 @override  
121 Widget build(BuildContext context) {  
122   print('build() MyHomePage');  
123   final mediaQuery = MediaQuery.of(context);  
124   final isLandscape = mediaQuery.orientation == Orientation.landscape;  
125  
126   final PreferredSizeWidget appBar = Platform.isIOS  
127       ? CupertinoNavigationBar(  
128           middle: Text(  
129             'Personal Expenses',  
130           ), // Text
```

PROBLEMS 63 OUTPUT DEBUG CONSOLE TERMINAL

```
Restarted application in 2,023ms.  
I/flutter ( 5501): build() MyHomePage  
I/flutter ( 5501): build() Chart  
3 I/flutter ( 5501): build() ChartBar  
I/chatty ( 5501): uid=10138(com.example.personal_expenses_04) 1.ui identical 3 lines  
I/flutter ( 5501): build() ChartBar  
I/flutter ( 5501): build() TransactionList
```



# **USING CONST WIDGETS AND CONSTRUCTORS**

File Edit Selection View Go Run Terminal Help chart\_bar.dart - personal\_expenses\_04 - Visual Studio Code

EXPLORER ... main.dart transaction\_item.dart chart\_bar adaptive\_flat\_button.dart new\_transaction.dart transaction\_list.dart

OPEN EDITORS lib > widgets > chart\_bar.dart > ChartBar

PERSONAL\_EXPENSES\_04 .dart\_tool .idea android assets build ios lib models transaction.dart widgets adaptive\_flat\_button.dart chart\_bar.dart chart.dart new\_transaction.dart transaction\_item.dart transaction\_list.dart user\_transactions.dart main.dart test web .gitignore .metadata packages

```
1 import 'package:flutter/material.dart';
2
3 class ChartBar extends StatelessWidget {
4   final String label;
5   final double spendingAmount;
6   final double spendingPctOfTotal;
7
8   const ChartBar(this.label, this.spendingAmount, this.spendingPctOfTotal);
9
10 @override
11 Widget build(BuildContext context) {
12   print('build() ChartBar');
13   return LayoutBuilder(
14     builder: (ctx, constraints) {
15       return Column(
16         children: <Widget>[
17           Container(
18             height: constraints.maxHeight * 0.15,
19             child: FittedBox(
20               child: Text('\$\${spendingAmount.toStringAsFixed(0)}'),
21             ), // FittedBox
22           ), // Container
23         ],
24       );
25     }
26   );
27 }
```

windows\chart\_bar.dart

Ln 9, Col 1 (77 selected) Spaces: 2 CRLF Dart Dart DevTools Flutter: 2.5.3 Pixel 2 API 29 (android-x86 emulator) Prettier

# **WRITING A GOOD CODE**

# “Good Code”

## Readability / Understandability

You should understand your code and be able to maintain / change it

Think about your “future self”!

Others should understand your code and be able to maintain / change it

## Performance

Certain practices (can) improve app performance

But: Missing possible improvements doesn't automatically result in a bad / laggy app

Always re-evaluate your code, explore new best practices

# **EXTRACTING WIDGETS**

File Edit Selection View Go Run Terminal Help transaction\_item.dart - personal\_expenses\_04 - Visual Studio Code

EXPLORER ... main.dart transaction\_item.dart chart\_bar AdaptiveFlatButton.dart new\_transaction.dart transaction\_list.dart

lib > widgets > transaction\_item.dart > TransactionItem > TransactionItem

```
1 import 'package:flutter/material.dart';
2 import 'package:intl/intl.dart';
3
4 import '../models/transaction.dart';
5
6 class TransactionItem extends StatelessWidget {
7   const TransactionItem({
8     Key key,
9     @required this.transaction,
10    @required this.deleteTx,
11  }) : super(key: key);
12
13 final Transaction transaction;
14 final Function deleteTx;
15
16 @override
17 Widget build(BuildContext context) {
18   return Card(
19     elevation: 5,
20     margin: EdgeInsets.symmetric(
21       vertical: 8,
22       horizontal: 5,
```

windows\transaction\_item.dart

Ln 11, Col 24 Spaces: 2 UTF-8 CRLF Dart Dart DevTools Flutter: 2.5.3 Pixel 2 API 29 (android-x86 emulator) Prettier

File Edit Selection View Go Run Terminal Help transaction\_item.dart - personal\_expenses\_04 - Visual Studio Code

EXPLORER ... main.dart transaction\_item.dart chart\_bar adaptive\_flat\_button.dart new\_transaction.dart transaction\_list.dart

OPEN EDITORS lib > widgets > transaction\_item.dart > TransactionItem > TransactionItem

PERSONAL\_EXPENSES\_04 .dart\_tool .idea android assets build ios lib models transaction.dart widgets adaptive\_flat\_button.dart chart\_bar.dart chart.dart new\_transaction.dart transaction\_item.dart transaction\_list.dart user\_transactions.dart main.dart test web .gitignore .metadata packages

```
16 @override
17 Widget build(BuildContext context) {
18     return Card(
19         elevation: 5,
20         margin: EdgeInsets.symmetric(
21             vertical: 8,
22             horizontal: 5,
23         ), // EdgeInsets.symmetric
24         child: ListTile(
25             leading: CircleAvatar(
26                 radius: 30,
27                 child: Padding(
28                     padding: const EdgeInsets.all(6),
29                     child: FittedBox(
30                         child: Text('\$\${transaction.amount}'),
31                     ), // FittedBox
32                     ), // Padding
33             ), // CircleAvatar
34             title: Text(
35                 transaction.title,
36                 style: Theme.of(context).textTheme.headline1,
37             ), // Text

```

widgets\transaction\_item.dart

Ln 11, Col 24 Spaces: 2 UTF-8 CRLF Dart Dart DevTools Flutter: 2.5.3 Pixel 2 API 29 (android-x86 emulator) Prettier

File Edit Selection View Go Run Terminal Help transaction\_item.dart - personal\_expenses\_04 - Visual Studio Code

EXPLORER ... main.dart transaction\_item.dart chart\_baraptive\_flat\_button.dart new\_transaction.dart transaction\_list.dart

OPEN EDITORS lib > widgets > transaction\_item.dart > TransactionItem > TransactionItem

PERSONAL\_EXPENSES\_04 .dart\_tool .idea android assets build ios lib models transaction.dart widgets adaptive\_flat\_button.dart chart\_bar.dart chart.dart new\_transaction.dart transaction\_item.dart transaction\_list.dart user\_transactions.dart main.dart test web .gitignore .metadata packages

36 style: Theme.of(context).textTheme.headline1,  
37 ), // Text  
38 subtitle: Text(  
39 DateFormat.yMMMd().format(transaction.date),  
40 ), // Text  
41 trailing: MediaQuery.of(context).size.width > 460  
42 ? FlatButton.icon(  
43 icon: const Icon(Icons.delete),  
44 label: const Text('Delete'),  
45 textColor: Theme.of(context).errorColor,  
46 onPressed: () => deleteTx(transaction.id),  
47 ) // FlatButton.icon  
48 : IconButton(  
49 icon: const Icon(Icons.delete),  
50 color: Theme.of(context).errorColor,  
51 onPressed: () => deleteTx(transaction.id),  
52 ), // IconButton  
53 ), // ListTile  
54 ); // Card  
55 }  
56 }  
57

widgets\transaction\_item.dart

Ln 11, Col 24 Spaces: 2 UTF-8 CRLF Dart Dart DevTools Flutter: 2.5.3 Pixel 2 API 29 (android-x86 emulator) Prettier

File Edit Selection View Go Run Terminal Help transaction\_list.dart - personal\_expenses\_04 - Visual Studio Code

EXPLORER ... main.dart transaction\_item.dart chart\_bar active\_flat\_button.dart new\_transaction.dart transaction\_list.dart X

OPEN EDITORS lib > widgets > transaction\_list.dart > TransactionList > build assets/images/waiting.png , fit: BoxFit.cover, ), // Image.asset // Container ], // <Widget>[] ); // Column ) // LayoutBuilder : ListView.builder( itemBuilder: (ctx, index) { return TransactionItem( transaction: transactions[index], deleteTx: deleteTx, ); // TransactionItem }, itemCount: transactions.length, ); // ListView.builder }

PERSONAL\_EXPENSES\_04 .dart\_tool .idea android assets build ios lib models transaction.dart widgets adaptive\_flat\_button.dart chart\_bar.dart chart.dart new\_transaction.dart transaction\_item.dart transaction\_list.dart user\_transactions.dart main.dart test web .gitignore .metadata packages

OUTLINE DEPENDENCIES

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widgets\transaction\_list.dart

# **USING BUILDER METHODS**

File Edit Selection View Go Run Terminal Help main.dart - personal\_expenses\_04 - Visual Studio Code

EXPLORER ... main.dart X transaction\_item.dart chart\_bar active\_flat\_button.dart new\_transaction.dart transaction\_list.dart

OPEN EDITORS lib > main.dart > \_MyHomePageState

main.dart lib transaction\_item.dart lib... chart\_bar.dart lib\widgets chart.dart lib\widgets adaptive\_flat\_button.dart... new\_transaction.dart lib... transaction\_list.dart lib\widgets

PERSONAL\_EXPENSES\_04 .dart\_tool .idea android assets build ios lib models transaction.dart widgets adaptive\_flat\_button.dart chart\_bar.dart chart.dart new\_transaction.dart transaction\_item.dart transaction\_list.dart user\_transactions.dart main.dart test web .gitignore .metadata packages

void \_deleteTransaction(String id) {  
 setState(() {  
 \_userTransactions.removeWhere((tx) => tx.id == id);  
 });  
}  
  
List<Widget> \_buildLandscapeContent(  
 MediaQueryData mediaQuery,  
 AppBar appBar,  
 Widget txListWidget,  
){  
 return [  
 Row(  
 mainAxisAlignment: MainAxisAlignment.center,  
 children: <Widget>[  
 Text(  
 'Show Chart',  
 style: Theme.of(context).textTheme.headline1,  
 ), // Text  
 Switch.adaptive(  
 activeColor: Theme.of(context).accentColor,  
 value: \_showChart,  
 onChanged: (val) {  
 setState(() {  
 \_showChart = val;  
 txListWidget = \_buildTxList(\_userTransactions);  
 });  
 },  
 ),  
 ],  
 ),  
 ];  
}

Ln 172, Col 1 (1352 selected) Spaces: 2 CRLF Dart Dart DevTools Flutter: 2.5.3 Pixel 2 API 29 (android-x86 emulator) Prettier

main.dart

File Edit Selection View Go Run Terminal Help main.dart - personal\_expenses\_04 - Visual Studio Code

EXPLORER ... main.dart X transaction\_item.dart chart\_bar active\_flat\_button.dart new\_transaction.dart transaction\_list.dart

OPEN EDITORS lib > main.dart > \_MyHomePageState

PERSONAL\_EXPENSES\_04 .dart\_tool .idea android assets build ios lib models transaction.dart widgets adaptive\_flat\_button.dart chart\_bar.dart chart.dart new\_transaction.dart transaction\_item.dart transaction\_list.dart user\_transactions.dart main.dart test web .gitignore .metadata packages

OUTLINE DEPENDENCIES

main.dart

```
134     activeColor: Theme.of(context).accentColor,
135     value: _showChart,
136     onChanged: (val) {
137       setState(() {
138         _showChart = val;
139       });
140     },
141   ), // Switch.adaptive
142   ], // <Widget>[]
143   ), // Row
144   _showChart
145     ? Container(
146       height: (mediaQuery.size.height -
147           appBar.preferredSize.height -
148           mediaQuery.padding.top) *
149             0.7,
150       child: Chart(_recentTransactions),
151     ) // Container
152     : txListWidget
153   ];
154 }
```

Ln 172, Col 1 (1352 selected) Spaces: 2 UTF-8 CRLF Dart Dart DevTools Flutter: 2.5.3 Pixel 2 API 29 (android-x86 emulator) Prettier

File Edit Selection View Go Run Terminal Help main.dart - personal\_expenses\_04 - Visual Studio Code

EXPLORER ... main.dart X transaction\_item.dart chart\_bar active\_flat\_button.dart new\_transaction.dart transaction\_list.dart

OPEN EDITORS lib > main.dart > \_MyHomePageState

main.dart lib transaction\_item.dart lib... chart\_bar.dart lib\widgets chart.dart lib\widgets adaptive\_flat\_button.dart... new\_transaction.dart lib... transaction\_list.dart lib\widgets

PERSONAL\_EXPENSES\_04 .dart\_tool .idea android assets build ios lib models transaction.dart widgets adaptive\_flat\_button.dart chart\_bar.dart chart.dart new\_transaction.dart transaction\_item.dart transaction\_list.dart user\_transactions.dart main.dart test web .gitignore .metadata packages

153 ... ];  
154 ... }  
155  
156 ... List<Widget> \_buildPortraitContent(  
157 ... MediaQueryData mediaQuery,  
158 ... AppBar appBar,  
159 ... Widget txListWidget,  
160 ... ) {  
161 ... return [  
162 ... Container(  
163 ... height: (mediaQuery.size.height -  
164 ... appBar.preferredSize.height -  
165 ... mediaQuery.padding.top) \*  
166 ... 0.3,  
167 ... child: Chart(\_recentTransactions),  
168 ... ), // Container  
169 ... txListWidget  
170 ... ];  
171 ... }  
172  
173 @override  
174 Widget build(BuildContext context) {

main.dart

Ln 172, Col 1 (1352 selected) Spaces: 2 CRLF Dart Dart DevTools Flutter: 2.5.3 Pixel 2 API 29 (android-x86 emulator) Prettier

File Edit Selection View Go Run Terminal Help main.dart - personal\_expenses\_04 - Visual Studio Code

EXPLORER ... main.dart X transaction\_item.dart chart\_baraptive\_flat\_button.dart new\_transaction.dart transaction\_list.dart

OPEN EDITORS lib > main.dart > \_MyHomePageState > build

PERSONAL\_EXPENSES\_04 .dart\_tool .idea android assets build ios lib models transaction.dart widgets adaptive\_flat\_button.dart chart\_bar.dart chart.dart new\_transaction.dart transaction\_item.dart transaction\_list.dart user\_transactions.dart main.dart test web .gitignore .metadata packages

main.dart 206 final txListWidget = Container( 207 height: MediaQuery.size.height - 208 appBar.preferredSize.height - 209 MediaQuery.padding.top) \* 210 0.7, 211 child: TransactionList(\_userTransactions, \_deleteTransaction), 212 ); // Container

213

214 final pageBody = SafeArea( 215 child: SingleChildScrollView( 216 child: Column( 217 crossAxisAlignment: CrossAxisAlignment.stretch, 218 children: <Widget>[ 219 if (isLandscape) 220 ...\_buildLandscapeContent( 221 MediaQuery, 222 appBar, 223 txListWidget, 224 ), 225 if (!isLandscape) 226 ...\_buildPortraitContent( 227 MediaQuery,

main.dart

Ln 214, Col 1 (577 selected) Spaces: 2 CRLF Dart Dart DevTools Flutter: 2.5.3 Pixel 2 API 29 (android-x86 emulator) Prettier

File Edit Selection View Go Run Terminal Help main.dart - personal\_expenses\_04 - Visual Studio Code

EXPLORER ... main.dart X transaction\_item.dart chart\_bar active\_flat\_button.dart new\_transaction.dart transaction\_list.dart

OPEN EDITORS lib > main.dart > \_MyHomePageState > build

...\_buildLandscapeContent(  
221 mediaQuery,  
222 appBar,  
223 txListWidget,  
224 ),  
225 if (!isLandscape)  
226 ...\_buildPortraitContent(  
227 mediaQuery,  
228 appBar,  
229 txListWidget,  
230 ),  
231 ], // <Widget>[]  
232 ), // Column  
233 ), // SingleChildScrollView  
234 ); // SafeArea  
235  
236 return Platform.isIOS  
237 ? CupertinoPageScaffold(  
238 child: pageBody,  
239 navigationBar: appBar,  
240 )  
241 : Scaffold(  
242 appBar: appBar,

main.dart

Ln 214, Col 1 (577 selected) Spaces: 2 CRLF Dart Dart DevTools Flutter: 2.5.3 Pixel 2 API 29 (android-x86 emulator) Prettier

File Edit Selection View Go Run Terminal Help main.dart - personal\_expenses\_04 - Visual Studio Code

EXPLORER ... main.dart X transaction\_item.dart chart\_bar active\_flat\_button.dart new\_transaction.dart transaction\_list.dart

OPEN EDITORS lib > main.dart > \_MyHomePageState > build

...\_buildLandscapeContent(  
221 mediaQuery,  
222 appBar,  
223 txListWidget,  
224 ),  
225 if (!isLandscape)  
226 ...\_buildPortraitContent(  
227 mediaQuery,  
228 appBar,  
229 txListWidget,  
230 ),  
231 ], // <Widget>[]  
232 ), // Column  
233 ), // SingleChildScrollView  
234 ); // SafeArea  
235  
236 return Platform.isIOS  
237 ? CupertinoPageScaffold(  
238 child: pageBody,  
239 navigationBar: appBar,  
240 )  
241 : Scaffold(  
242 appBar: appBar,

main.dart

Ln 214, Col 1 (577 selected) Spaces: 2 CRLF Dart Dart DevTools Flutter: 2.5.3 Pixel 2 API 29 (android-x86 emulator) Prettier

File Edit Selection View Go Run Terminal Help main.dart - personal\_expenses\_04 - Visual Studio Code

EXPLORER ... main.dart X transaction\_item.dart chart\_bar active\_flat\_button.dart new\_transaction.dart transaction\_list.dart

OPEN EDITORS lib > main.dart > \_MyHomePageState

main.dart lib transaction\_item.dart lib\ widgets chart\_bar.dart lib\widgets chart.dart lib\widgets adaptive\_flat\_button.dart lib\widgets new\_transaction.dart lib\widgets transaction\_list.dart lib\widgets

PERSONAL\_EXPENSES\_04 .dart\_tool .idea android assets build ios lib models transaction.dart widgets adaptive\_flat\_button.dart chart\_bar.dart chart.dart new\_transaction.dart transaction\_item.dart transaction\_list.dart user\_transactions.dart main.dart test web .gitignore .metadata packages

OUTLINE DEPENDENCIES

167 child: Chart(\_recentTransactions),  
168 ), // Container  
169 txListWidget  
170 ];  
171 }  
172  
173 PreferredSizeWidget \_buildAppBar() {  
174 return Platform.isIOS  
175 ? CupertinoNavigationBar(  
176 middle: Text(  
177 'Personal Expenses',  
178 ), // Text  
179 trailing: Row(  
180 mainAxisSize: MainAxisSize.min,  
181 children: <Widget>[  
182 GestureDetector(  
183 child: Icon(CupertinoIcons.add),  
184 onTap: () => \_startAddNewTransaction(context),  
185 ), // GestureDetector  
186 ], // <Widget>[]  
187 ), // Row  
188 ) // CupertinoNavigationBar

main.dart

Ln 201, Col 1 (827 selected) Spaces: 2 UTF-8 CRLF Dart Dart DevTools Flutter: 2.5.3 Pixel 2 API 29 (android-x86 emulator) Prettier

File Edit Selection View Go Run Terminal Help main.dart - personal\_expenses\_04 - Visual Studio Code

EXPLORER ... main.dart X transaction\_item.dart chart\_baraptive\_flat\_button.dart new\_transaction.dart transaction\_list.dart

OPEN EDITORS lib > main.dart > \_MyHomePageState

185 ), // GestureDetector  
186 ], // <Widget>[]  
187 ), // Row  
188 ) // CupertinoNavigationBar  
189 : AppBar(  
190 title: Text(  
191 'Personal Expenses',  
192 ), // Text  
193 actions: <Widget>[  
194 IconButton(  
195 icon: Icon(Icons.add),  
196 onPressed: () => \_startAddNewTransaction(context),  
197 ), // IconButton  
198 ], // <Widget>[]  
199 ); // AppBar  
200 }  
201  
202 @override  
203 Widget build(BuildContext context) {  
204 print('build() MyHomePage');  
205 final mediaQuery = MediaQuery.of(context);  
206 final isLandscape = mediaQuery.orientation == Orientation.landscape;

main.dart

Ln 201, Col 1 (827 selected) Spaces: 2 CRLF Dart Dart DevTools Flutter: 2.5.3 Pixel 2 API 29 (android-x86 emulator) Prettier



EXPLORER

OPEN EDITORS

- main.dart lib
- transaction\_item.dart
- chart\_bar.dart
- chart.dart
- adaptive\_flat\_button.dart
- new\_transaction.dart
- transaction\_list.dart

PERSONAL\_EXPENSES\_04

- .dart\_tool
- .idea
- android
- assets
- build
- ios
- lib
  - models
    - transaction.dart
  - widgets
    - adaptive\_flat\_button.dart
    - chart\_bar.dart
    - chart.dart
    - new\_transaction.dart
    - transaction\_item.dart
    - transaction\_list.dart
    - user\_transactions.dart
  - main.dart
- test
- web
- .gitignore
- .metadata

OUTLINE

DEPENDENCIES

main.dart X transaction\_item.dart chart\_bar.dart adaptive\_flat\_button.dart new\_transaction.dart transaction\_list.dart

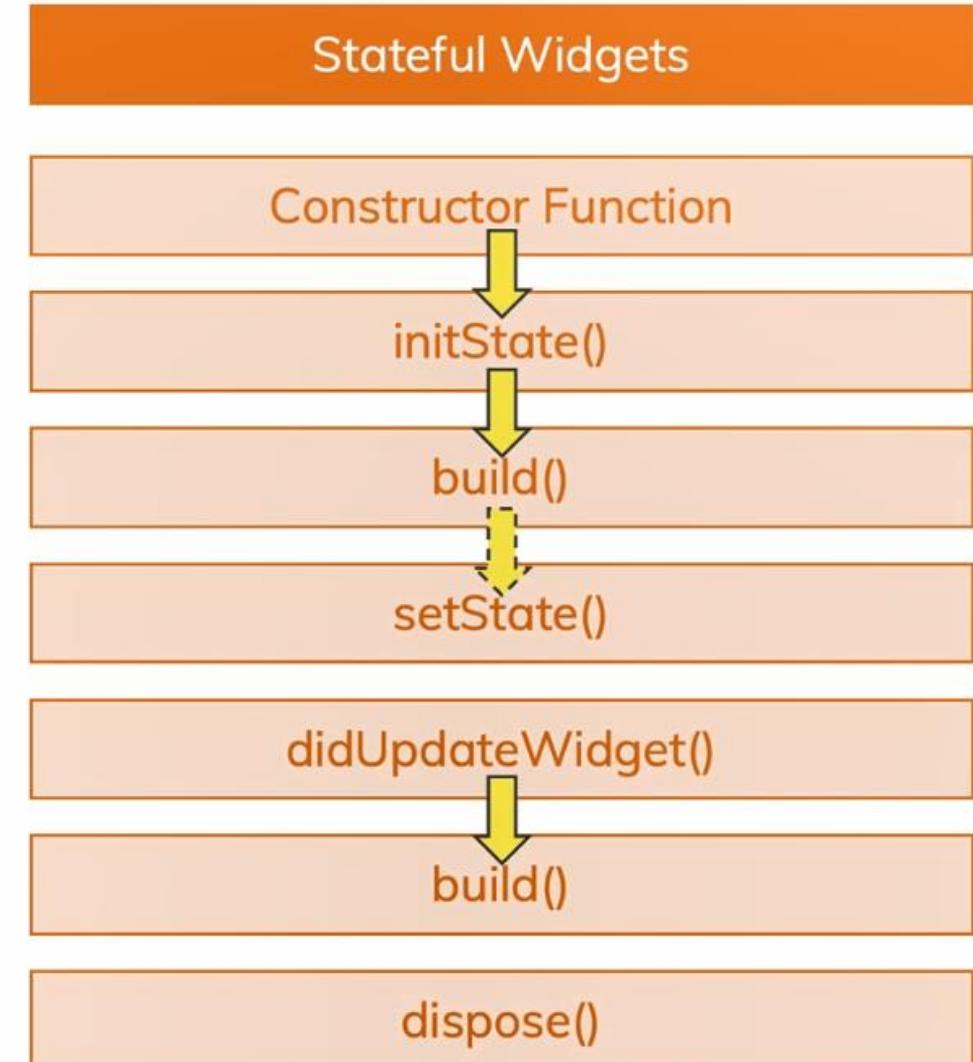
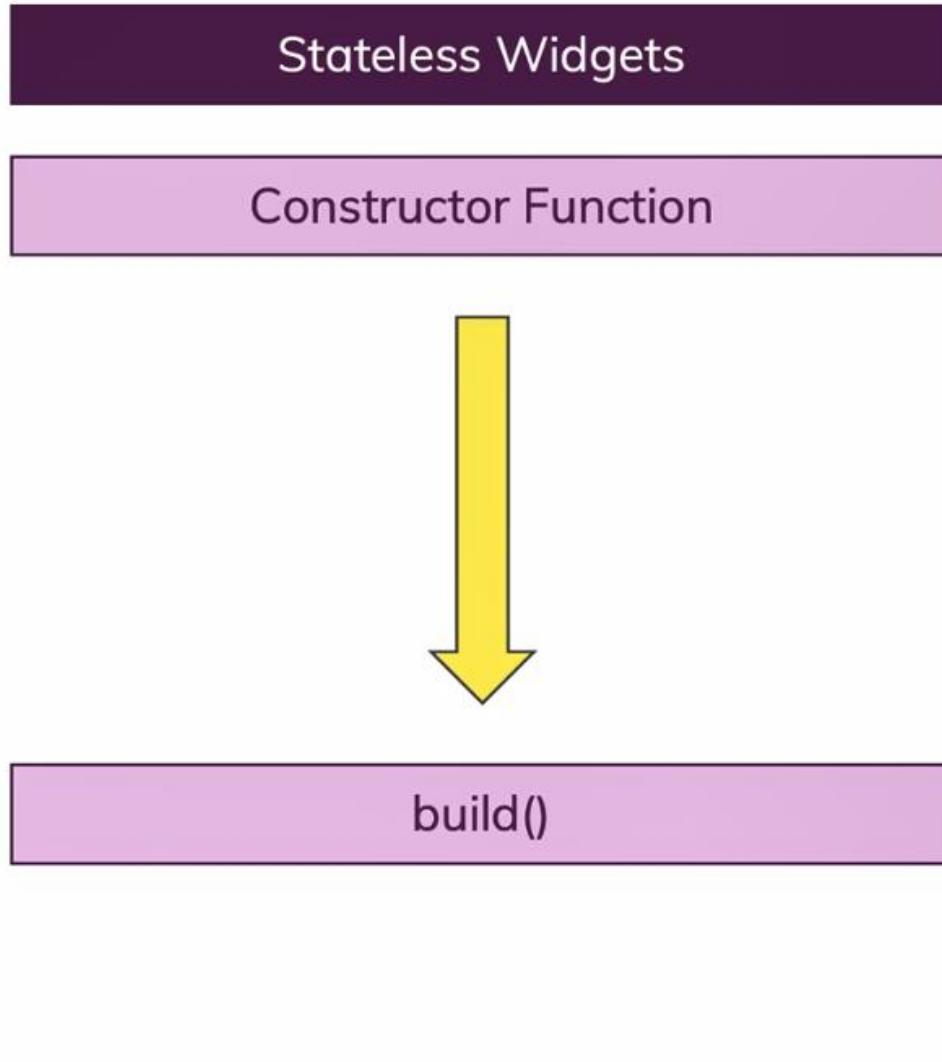
lib > main.dart > \_MyHomePageState > build

```
196     onPressed: () => _startAddNewTransaction(context),
197         ), // IconButton
198     ], // <Widget>[]
199   ); // AppBar
200 }
201
202 @override
203 Widget build(BuildContext context) {
204   print('build() MyHomePage');
205   final mediaQuery = MediaQuery.of(context);
206   final isLandscape = mediaQuery.orientation == Orientation.landscape;
207   final PreferredSizeWidget appBar = _buildAppBar();
208   final txListWidget = Container(
209     height: (mediaQuery.size.height -
210             appBar.preferredSize.height -
211             mediaQuery.padding.top) *
212             0.7,
213     child: TransactionList(_userTransactions, _deleteTransaction),
214   ); // Container
215
216   final pageBody = SafeArea(
217     child: SingleChildScrollView(
218       child: Column(
```

main.dart

# **UNDERSTANDING THE WIDGET LIFECYCLE**

# Widget Lifecycle



File Edit Selection View Go Run Terminal Help new\_transaction.dart - personal\_expenses\_04 - Visual Studio Code

EXPLORER ... main.dart transaction\_item.dart chart\_bar positive\_flat\_button.dart new\_transaction.dart transaction\_list.dart

OPEN EDITORS lib > widgets > new\_transaction.dart > NewTransaction

main.dart lib transaction\_item.dart lib\... chart\_bar.dart lib\widgets chart.dart lib\widgets adaptive\_flat\_button.dart... new\_transaction.dart lib\... transaction\_list.dart lib\w...

PERSONAL\_EXPENSES\_04 .dart\_tool .idea android assets build ios lib models transaction.dart widgets adaptive\_flat\_button.dart chart\_bar.dart chart.dart new\_transaction.dart transaction\_item.dart transaction\_list.dart user\_transactions.dart main.dart test web .gitignore .metadata packages

OUTLINE DEPENDENCIES

```
3 import 'package:flutter/cupertino.dart';
4 import 'package:flutter/material.dart';
5 import 'package:intl/intl.dart';
6
7 import 'adaptive_flat_button.dart';
8
9 class NewTransaction extends StatefulWidget {
10   final Function addTx;
11
12   NewTransaction(this.addTx) {
13     print("Constructor NewTransaction");
14   }
15
16   @override
17   _NewTransactionState createState() {
18     print("createState NewTransaction");
19     return _NewTransactionState();
20   }
21 }
22
23 class _NewTransactionState extends State<NewTransaction> {
24   final _titleController = TextEditingController();
```

windows\new\_transaction.dart

Ln 21, Col 1 (217 selected) Spaces: 2 CRLF Dart Dart DevTools Flutter: 2.5.3 Pixel 2 API 29 (android-x86 emulator) Prettier

File Edit Selection View Go Run Terminal Help new\_transaction.dart - personal\_expenses\_04 - Visual Studio Code

EXPLORER ... main.dart transaction\_item.dart chart\_bar active\_flat\_button.dart new\_transaction.dart transaction\_list.dart

OPEN EDITORS lib > widgets > new\_transaction.dart > \_NewTransactionState > dispose

main.dart lib transaction\_item.dart lib\... chart\_bar.dart lib\widgets chart.dart lib\widgets adaptive\_flat\_button.dart... new\_transaction.dart lib\... transaction\_list.dart lib\w...

PERSONAL\_EXPENSES\_04 .dart\_tool .idea android assets build ios lib models transaction.dart widgets adaptive\_flat\_button.dart chart\_bar.dart chart.dart new\_transaction.dart transaction\_item.dart transaction\_list.dart user\_transactions.dart main.dart test web .gitignore .metadata packages

OUTLINE DEPENDENCIES

28     `_NewTransactionState() {`  
29         `print("Constructor NewTransaction State");`  
30     }  
31  
32     `@override`  
33         `void initState() {`  
34             `super.initState();`  
35             `print("initState() NewTransaction State");`  
36         }  
37  
38     `@override`  
39         `void didUpdateWidget(covariant NewTransaction oldWidget) {`  
40             `super.didUpdateWidget(oldWidget);`  
41             `print("didUpdateWidget() NewTransaction State");`  
42         }  
43  
44     `@override`  
45         `void dispose() {`  
46             `super.dispose();`  
47             `print("dispose() NewTransaction State");`  
48         }  
49

widgets\new\_transaction.dart

Ln 47, Col 19 Spaces: 2 UTF-8 CRLF Dart Dart DevTools Flutter: 2.5.3 Pixel 2 API 29 (android-x86 emulator) Prettier

File Edit Selection View Go Run Terminal Help new\_transaction.dart - personal\_expenses\_04 - Visual Studio Code

EXPLORER ... main.dart transaction\_item.dart chart\_bar.dart adaptive\_flat\_button.dart new\_transaction.dart transaction\_list.dart

OPEN EDITORS lib > widgets > new\_transaction.dart > \_NewTransactionState > build

83 );  
84 print('...');  
85 }  
86  
87 @override  
88 Widget build(BuildContext context) {  
89 print("build() NewTransaction State");  
90 return SingleChildScrollView(  
91 child: Card(  
92 elevation: 5,  
93 child: Container(

PROBLEMS 66 OUTPUT DEBUG CONSOLE TERMINAL

I/flutter ( 5674): Constructor NewTransaction  
I/flutter ( 5674): createState NewTransaction  
I/flutter ( 5674): Constructor NewTransaction State  
I/flutter ( 5674): initState() NewTransaction State  
I/flutter ( 5674): build() NewTransaction State  
I/flutter ( 5674): build() AdaptiveFlatButton

Personal Expenses 12:28 ⚡ +

No transactions added yet!

Z

Title

Amount

No Date Chosen! Choose Date

Add Transaction

windows\new\_transaction.dart

Ln 137, Col 11 Spaces: 2 UTF-8 CRLF Dart Dart DevTools Flutter: 2.5.3 Pixel 2 API 29 (android-x86 emulator) Prettier

# **UNDERSTANDING THE APP LIFECYCLE**

# App Lifecycle

Lifecycle State Name	When is it hit?
inactive	App is inactive, no user input received
paused	App not visible to user, running in background
resumed	App is (again) visible and responding to user input
suspending	App is about to be suspended (exited)

File Edit Selection View Go Run Terminal Help main.dart - personal\_expenses\_04 - Visual Studio Code

EXPLORER ... main.dart X transaction\_item.dart chart\_bar active\_flat\_button.dart new\_transaction.dart transaction\_list.dart

OPEN EDITORS lib > main.dart > \_MyHomePageState

main.dart lib transaction\_item.dart lib... chart\_bar.dart lib\widgets chart.dart lib\widgets adaptive\_flat\_button.dart... new\_transaction.dart lib... transaction\_list.dart lib\widgets

PERSONAL\_EXPENSES\_04 .dart\_tool .idea android assets build ios lib models transaction.dart widgets adaptive\_flat\_button.dart chart\_bar.dart chart.dart new\_transaction.dart transaction\_item.dart transaction\_list.dart user\_transactions.dart main.dart test web .gitignore .metadata packages

OUTLINE

DEPENDENCIES

main.dart

```
57 class _MyHomePageState extends State<MyHomePage> with WidgetsBindingObserver {  
58     final List<Transaction> _userTransactions = [  
59         // Transaction(  
60         //     id: 't1',  
61         //     title: 'Sepatu Baru',  
62         //     amount: 20.99,  
63         //     date: DateTime.now(),  
64         // ),  
65         // Transaction(  
66         //     id: 't2',  
67         //     title: 'Belanja Harian',  
68         //     amount: 18.53,  
69         //     date: DateTime.now(),  
70         // ),  
71     ];  
72     bool _showChart = false;  
73  
74     @override  
75     didChangeAppLifecycleState(AppLifecycleState state) {}  
76  
77     @override  
78     void dispose() {
```

Ln 57, Col 77 (22 selected) Spaces: 2 CRLF Dart Dart DevTools Flutter: 2.5.3 Pixel 2 API 29 (android-x86 emulator) Prettier

File Edit Selection View Go Run Terminal Help main.dart - personal\_expenses\_04 - Visual Studio Code

EXPLORER ... main.dart X transaction\_item.dart chart\_bar.dartaptive\_flat\_button.dart new\_transaction.dart transaction\_list.dart

OPEN EDITORS lib > main.dart > \_MyHomePageState

main.dart lib transaction\_item.dart lib\widgets chart\_bar.dart lib\widgets chart.dart lib\widgets adaptive\_flat\_button.dart new\_transaction.dart lib\widgets transaction\_list.dart lib\widgets

PERSONAL\_EXPENSES\_04 .dart\_tool .idea android assets build ios lib models transaction.dart widgets adaptive\_flat\_button.dart chart\_bar.dart chart.dart new\_transaction.dart transaction\_item.dart transaction\_list.dart user\_transactions.dart main.dart test web .gitignore .metadata packages

OUTLINE DEPENDENCIES

71 ];  
72 bool \_showChart = false;  
73  
74 @override  
75 void initState(){  
76 super.initState();  
77 WidgetsBinding.instance.addObserver(this);  
78 }  
79  
80 @override  
81 void didChangeAppLifecycleState(AppLifecycleState state){  
82 print(state);  
83 }  
84  
85 @override  
86 void dispose(){  
87 super.dispose();  
88 WidgetsBinding.instance.removeObserver(this);  
89 }  
90  
91 List<Transaction> get \_recentTransactions {  
92 return \_userTransactions.where((tx) {  
93 return tx.date.isAfter(  
main.dart

Ln 90, Col 1 (326 selected) Spaces: 2 CRLF Dart Dart DevTools Flutter: 2.5.3 Pixel 2 API 29 (android-x86 emulator) Prettier

EXPLORER

OPEN EDITORS

- main.dart lib
- transaction\_item.dart
- chart\_bar.dart
- chart.dart
- adaptive\_flat\_button.dart
- new\_transaction.dart
- transaction\_list.dart

PERSONAL\_EXPENSES\_04

- .dart\_tool
- .idea
- android
- assets
- build
- ios
- lib
  - models
    - transaction.dart
  - widgets
    - adaptive\_flat\_button.dart
    - chart\_bar.dart
    - chart.dart
    - new\_transaction.dart
    - transaction\_item.dart
    - transaction\_list.dart
    - user\_transactions.dart
- main.dart

test

web

.gitignore

.metadata

packages

OUTLINE

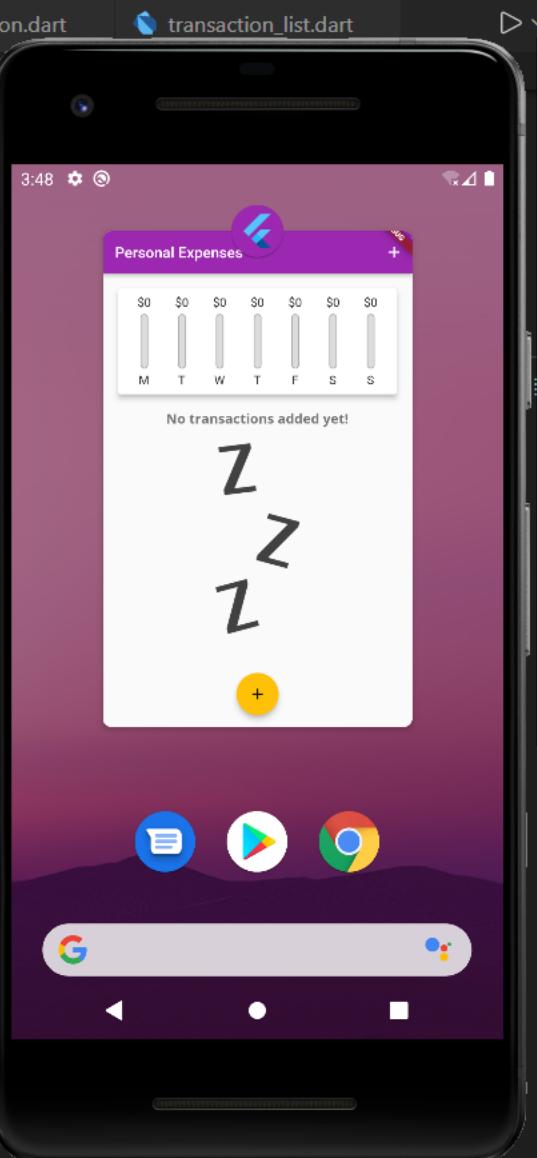
DEPENDENCIES

lib > main.dart > \_MyHomePageState

```
71   ];
72   bool _showChart = false;
73
74   @override
75   void initState() {
```

PROBLEMS 67 OUTPUT DEBUG CONSOLE TERMINAL

```
Restarted application in 1,692ms.
I/flutter ( 5674): build() MyHomePage
I/flutter ( 5674): build() Chart
I/flutter ( 5674): build() ChartBar
I/chatty ( 5674): uid=10138(com.example.personal_expenses_04) 1.ui identical
I/flutter ( 5674): build() ChartBar
I/flutter ( 5674): build() TransactionList
I/flutter ( 5674): AppLifecycleState.inactive
D/EGL_emulation( 5674): eglGetCurrent: 0xd781a0c0: ver 3 0 (tinfo 0xd780f730)
I/flutter ( 5674): AppLifecycleState.paused
I/flutter ( 5674): AppLifecycleState.resumed
D/EGL_emulation( 5674): eglGetCurrent: 0xeaa53800: ver 3 0 (tinfo 0xd780f730)
D/EGL_emulation( 5674): eglGetCurrent: 0xd781a0c0: ver 3 0 (tinfo 0xd780f730)
I/flutter ( 5674): AppLifecycleState.inactive
D/EGL_emulation( 5674): eglGetCurrent: 0xd781a0c0: ver 3 0 (tinfo 0xd780f730)
I/flutter ( 5674): AppLifecycleState.paused
```



main.dart

File Edit Selection View Go Run Terminal Help main.dart - personal\_expenses\_04 - Visual Studio Code

EXPLORER ... main.dart X transaction\_item.dart chart\_bar active\_flat\_button.dart new\_transaction.dart transaction\_list.dart

OPEN EDITORS lib > main.dart > \_MyHomePageState

main.dart lib transaction\_item.dart lib\ widgets chart\_bar.dart lib\ widgets chart.dart lib\ widgets adaptive\_flat\_button.dart lib\ widgets new\_transaction.dart lib\ widgets transaction\_list.dart lib\ widgets

PERSONAL\_EXPENSES\_04 .dart\_tool .idea android assets build ios lib models transaction.dart widgets adaptive\_flat\_button.dart chart\_bar.dart chart.dart new\_transaction.dart transaction\_item.dart transaction\_list.dart user\_transactions.dart main.dart test web .gitignore .metadata packages

PROBLEMS 67 OUTPUT DEBUG CONSOLE TERMINAL

```
I/flutter ( 5674): build() MyHomePage  
I/flutter ( 5674): build() Chart  
I/flutter ( 5674): build() ChartBar  
I/chatty ( 5674): uid=10138(com.example.personal_expenses_04) 1.ui identical  
I/flutter ( 5674): build() ChartBar  
I/flutter ( 5674): build() TransactionList  
I/flutter ( 5674): AppLifecycleState.inactive  
D/EGL_emulation( 5674): eglGetCurrent: 0xd781a0c0: ver 3 0 (tinfo 0xd780f73e)  
I/flutter ( 5674): AppLifecycleState.paused  
I/flutter ( 5674): AppLifecycleState.resumed  
② D/EGL_emulation( 5674): eglGetCurrent: 0xeaa53800: ver 3 0 (tinfo 0xd780f73e)  
D/EGL_emulation( 5674): eglGetCurrent: 0xd781a0c0: ver 3 0 (tinfo 0xd780f73e)  
I/flutter ( 5674): AppLifecycleState.inactive  
D/EGL_emulation( 5674): eglGetCurrent: 0xd781a0c0: ver 3 0 (tinfo 0xd780f73e)  
I/flutter ( 5674): AppLifecycleState.paused  
I/flutter ( 5674): AppLifecycleState.resumed  
② D/EGL_emulation( 5674): eglGetCurrent: 0xeaa53800: ver 3 0 (tinfo 0xd780f7b6)  
D/EGL_emulation( 5674): eglGetCurrent: 0xd781a0c0: ver 3 0 (tinfo 0xd780f730)
```

3:48 ⚡ Personal Expenses +  
\$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0  
M T W T F S S S  
No transactions added yet!

Ln 90, Col 1 (326 selected) Spaces: 2 CRLF Dart Dart DevTools Flutter: 2.5.3 Pixel 2 API 29 (android-x86 emulator) Prettier

File Edit Selection View Go Run Terminal Help main.dart - personal\_expenses\_04 - Visual Studio Code

EXPLORER ... main.dart X transaction\_item.dart chart\_bar.dart chart.dart adaptive\_flat\_button.dart new\_transaction.dart transaction\_list.dart

OPEN EDITORS lib > main.dart > \_MyHomePageState

main.dart lib transaction\_item.dart lib\ widgets chart\_bar.dart lib\ widgets chart.dart lib\ widgets adaptive\_flat\_button.dart lib\ widgets new\_transaction.dart lib\ widgets transaction\_list.dart lib\ widgets

PERSONAL\_EXPENSES\_04 .dart\_tool .idea android assets build ios lib models transaction.dart widgets adaptive\_flat\_button.dart chart\_bar.dart chart.dart new\_transaction.dart transaction\_item.dart transaction\_list.dart user\_transactions.dart main.dart test web .gitignore .metadata packages

71 ];  
72 bool \_showChart = false;  
73  
74 @override  
75 void initState() {

PROBLEMS 67 OUTPUT DEBUG CONSOLE TERMINAL

```
I/flutter ( 5674): AppLifecycleState.inactive  
D/EGL_emulation( 5674): eglGetCurrentContext: 0xd781a0c0: ver 3 0 (tinfo 0xd780f73e)  
I/flutter ( 5674): AppLifecycleState.paused  
I/flutter ( 5674): AppLifecycleState.resumed  
D/EGL_emulation( 5674): eglGetCurrentContext: 0xeaa53800: ver 3 0 (tinfo 0xd780f73e)  
D/EGL_emulation( 5674): eglGetCurrentContext: 0xd781a0c0: ver 3 0 (tinfo 0xd780f73e)  
I/flutter ( 5674): AppLifecycleState.inactive  
D/EGL_emulation( 5674): eglGetCurrentContext: 0xd781a0c0: ver 3 0 (tinfo 0xd780f73e)  
I/flutter ( 5674): AppLifecycleState.paused  
I/flutter ( 5674): AppLifecycleState.resumed  
D/EGL_emulation( 5674): eglGetCurrentContext: 0xeaa53800: ver 3 0 (tinfo 0xd780f73e)  
D/EGL_emulation( 5674): eglGetCurrentContext: 0xd781a0c0: ver 3 0 (tinfo 0xd780f73e)  
I/flutter ( 5674): AppLifecycleState.inactive  
D/EGL_emulation( 5674): eglGetCurrentContext: 0xd781a0c0: ver 3 0 (tinfo 0xd780f73e)  
I/flutter ( 5674): AppLifecycleState.paused  
I/flutter ( 5674): AppLifecycleState.detached  
Lost connection to device.  
Exited (sigterm)
```

4:06 ⚡ Sunday, Nov 28

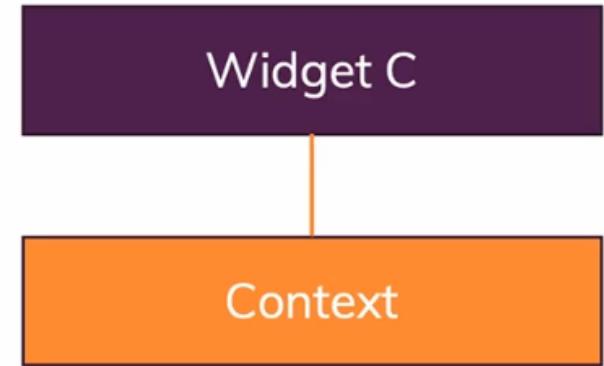
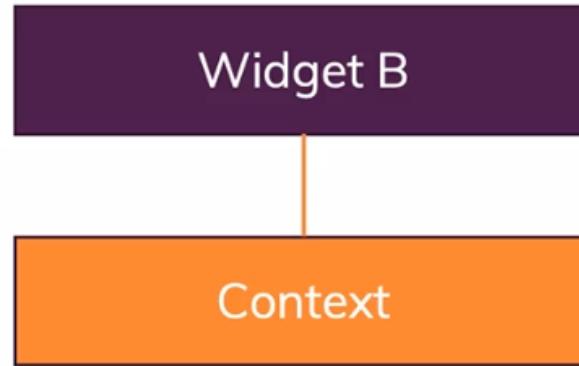
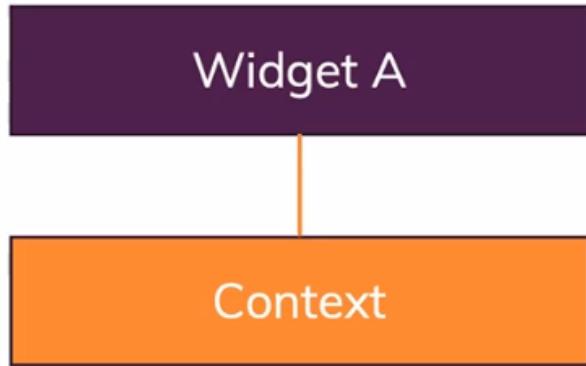


The screenshot shows a Flutter application running on an Android emulator. The phone's screen is pink, displaying the date "Sunday, Nov 28" and the time "4:06". At the bottom, there are three icons: a blue speech bubble, a green triangle, and a red circle. A navigation bar with three dots is visible at the very bottom.

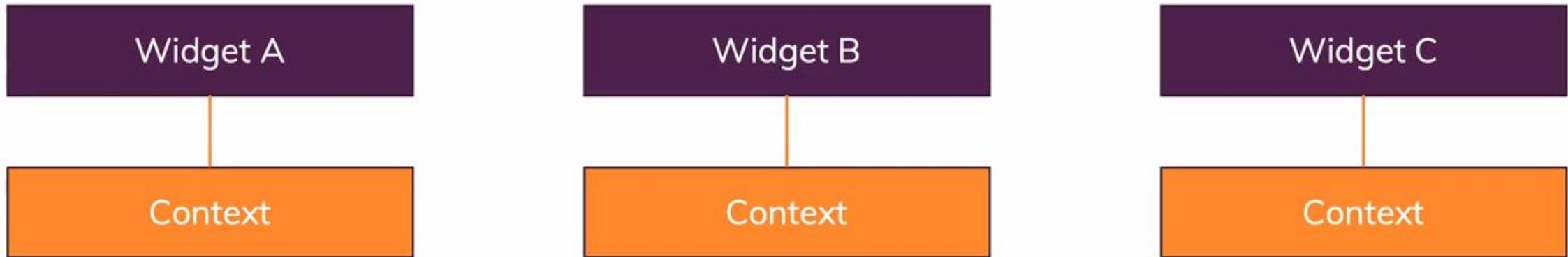
Ln 90, Col 1 (326 selected) Spaces: 2 CRLF Dart Dart DevTools Flutter: 2.5.3 Pixel 2 API 29 (android-x86 emulator) Prettier

# **UNDERSTANDING CONTEXT**

# Understanding “Context”

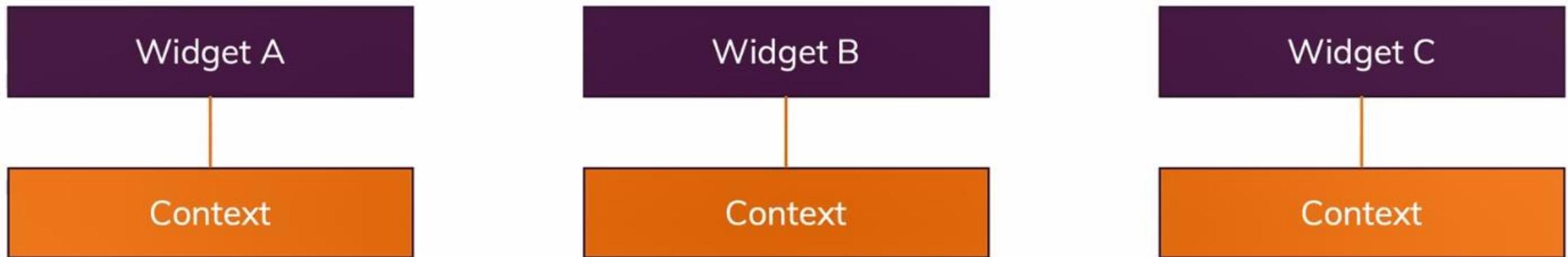


# Understanding “Context”



Meta Information **on** the Widget & its Location in the Widget Tree

# Understanding “Context”

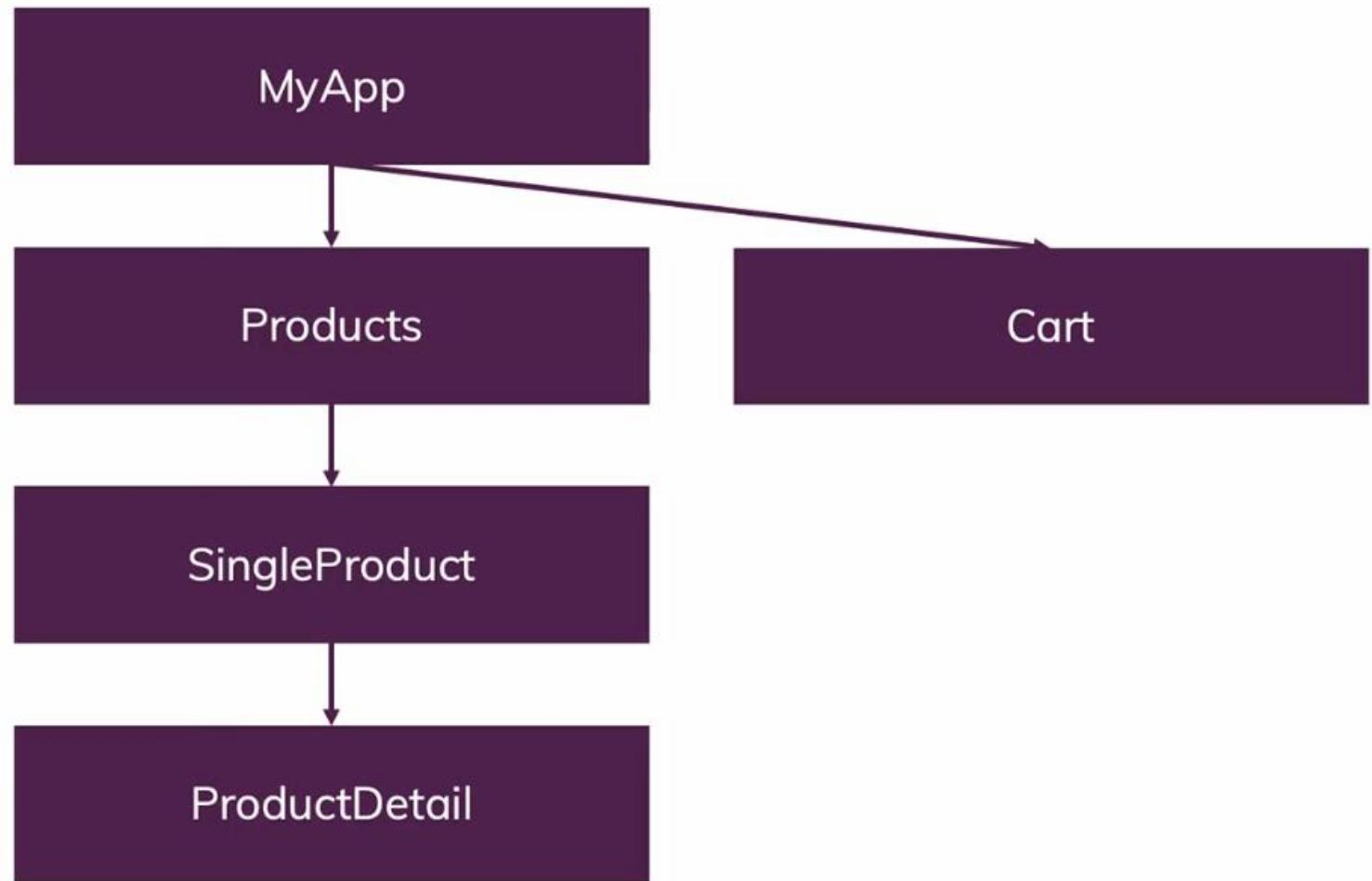


Meta Information on the Widget & its Location in the Widget Tree

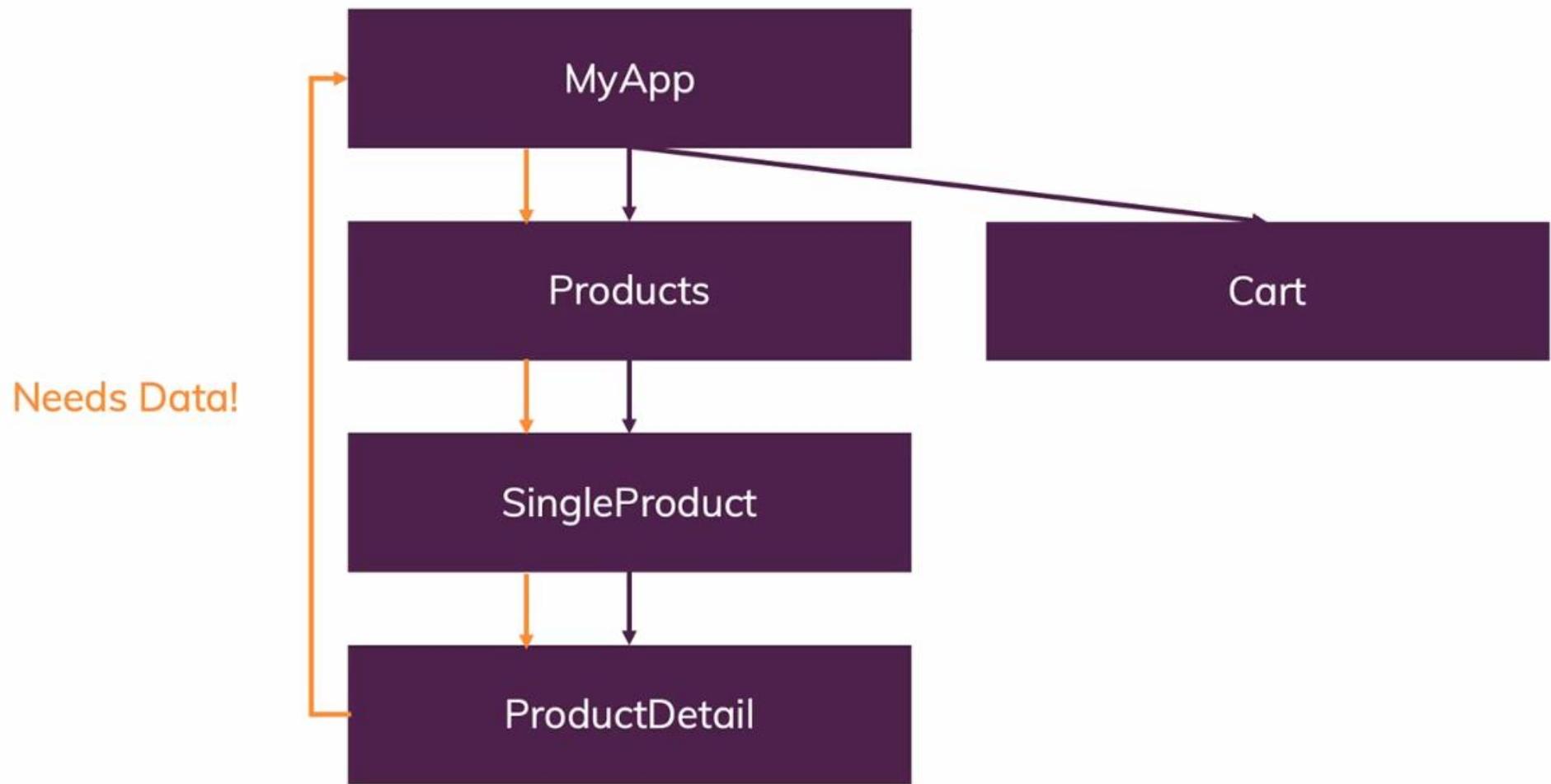
Material Theme

Navigator

# The InheritedWidget



# The InheritedWidget



# A PROBLEM WITH LISTS AND STATEFUL WIDGETS

File Edit Selection View Go Run Terminal Help transaction\_item.dart - personal\_expenses\_04 - Visual Studio Code

EXPLORER ... main.dart transaction\_item.dart chart\_bar adaptive\_flat\_button.dart new\_transaction.dart transaction\_list.dart

OPEN EDITORS lib > widgets > transaction\_item.dart > TransactionItem

main.dart lib transaction\_item.dart lib\transaction\_item.dart lib\chart\_bar.dart lib\widgets\chart\_bar.dart lib\chart.dart lib\widgets\chart.dart lib\adaptive\_flat\_button.dart lib\widgets\adaptive\_flat\_button.dart lib\new\_transaction.dart lib\widgets\new\_transaction.dart lib\transaction\_list.dart lib\widgets\transaction\_list.dart

PERSONAL\_EXPENSES\_04 .dart\_tool .idea android assets build ios lib models transaction.dart widgets adaptive\_flat\_button.dart chart\_bar.dart chart.dart new\_transaction.dart transaction\_item.dart transaction\_list.dart user\_transactions.dart main.dart test web .gitignore .metadata packages

transaction\_item.dart

```
1 import 'package:flutter/material.dart';
2 import 'package:intl/intl.dart';
3
4 import '../models/transaction.dart';
5
6 class TransactionItem extends StatelessWidget {
7     const TransactionItem({
8         Key key,
9         @required this.transaction,
10        @required this.deleteTx,
11    }) : super(key: key);
12
13    final Transaction transaction;
14    final Function deleteTx;
15
16    @override
17    Widget build(BuildContext context) {
18        return Card(
19            elevation: 5,
20            margin: EdgeInsets.symmetric(
21                vertical: 8,
22                horizontal: 5,
```

windows\transaction\_item.dart

Ln 6, Col 35 Spaces: 2 UTF-8 CRLF Dart Dart DevTools Flutter: 2.5.3 Pixel 2 API 29 (android-x86 emulator) Prettier

File Edit Selection View Go Run Terminal Help transaction\_item.dart - personal\_expenses\_04 - Visual Studio Code

EXPLORER ... main.dart transaction\_item.dart chart\_baraptive\_flat\_button.dart new\_transaction.dart transaction\_list.dart

lib > widgets > transaction\_item.dart > \_TransactionItemState > build

```
1 import 'dart:math';
2
3 import 'package:flutter/material.dart';
4 import 'package:intl/intl.dart';
5
6 import '../models/transaction.dart';
7
8 class TransactionItem extends StatefulWidget {
9     const TransactionItem({
10         Key key,
11         @required this.transaction,
12         @required this.deleteTx,
13     }) : super(key: key);
14
15     final Transaction transaction;
16     final Function deleteTx;
17
18     @override
19     _TransactionItemState createState() => _TransactionItemState();
20 }
21
22 class _TransactionItemState extends State<TransactionItem> {
```

wIDGETS\transaction\_item.dart

Ln 59, Col 55 Spaces: 2 UTF-8 CRLF Dart Dart DevTools Flutter: 2.5.3 Pixel 2 API 29 (android-x86 emulator) Prettier

File Edit Selection View Go Run Terminal Help transaction\_item.dart - personal\_expenses\_04 - Visual Studio Code

EXPLORER ... main.dart transaction\_item.dart chart\_bar.dart adaptive\_flat\_button.dart new\_transaction.dart transaction\_list.dart

OPEN EDITORS lib > widgets > transaction\_item.dart > \_TransactionItemState

PERSONAL\_EXPENSES\_04 .dart\_tool .idea android assets build ios lib models transaction.dart widgets adaptive\_flat\_button.dart chart\_bar.dart chart.dart new\_transaction.dart transaction\_item.dart transaction\_list.dart user\_transactions.dart main.dart test web .gitignore .metadata packages

OUTLINE DEPENDENCIES

transaction\_item.dart

```
21
22 class _TransactionItemState extends State<TransactionItem> {
23   Color _bgColor;
24
25   @override
26   void initState() {
27     const availableColors = [
28       Colors.red,
29       Colors.black,
30       Colors.blue,
31       Colors.purple,
32     ];
33
34     _bgColor = availableColors[Random().nextInt(4)];
35     super.initState();
36   }
37
38   @override
39   Widget build(BuildContext context) {
40     return Card(
41       elevation: 5,
42       margin: EdgeInsets.symmetric(
```

windows\transaction\_item.dart

Ln 37, Col 1 (262 selected) Spaces: 2 CRLF Dart Dart DevTools Flutter: 2.5.3 Pixel 2 API 29 (android-x86 emulator) Prettier

File Edit Selection View Go Run Terminal Help transaction\_item.dart - personal\_expenses\_04 - Visual Studio Code

EXPLORER ... main.dart transaction\_item.dart chart\_baraptive\_flat\_button.dart new\_transaction.dart transaction\_list.dart

OPEN EDITORS lib > widgets > transaction\_item.dart > \_TransactionItemState > build

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```
39     Widget build(BuildContext context) {  
40         return Card(  
41             elevation: 5,  
42             margin: EdgeInsets.symmetric(  
43                 vertical: 8,  
44                 horizontal: 5,  
45             ), // EdgeInsets.symmetric  
46             child: ListTile(  
47                 leading: CircleAvatar(  
48                     backgroundColor: _bgColor,  
49                     radius: 30,  
50                 child: Padding(  
51                     padding: const EdgeInsets.all(6),  
52                     child: FittedBox(  
53                         child: Text('\$\${widget.transaction.amount}'),  
54                     ), // FittedBox  
55                 ), // Padding  
56             ), // CircleAvatar  
57             title: Text(  
58                 widget.transaction.title,  
59                 style: Theme.of(context).textTheme.headline1,  
60             ), // Text
```

widgets\transaction\_item.dart

Ln 49, Col 1 (38 selected) Spaces: 2 CRLF Dart Dart DevTools Flutter: 2.5.3 Pixel 2 API 29 (android-x86 emulator) Prettier

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EXPLORER ... main.dart transaction\_item.dart chart\_bar active\_flat\_button.dart new\_transaction.dart transaction\_list.dart

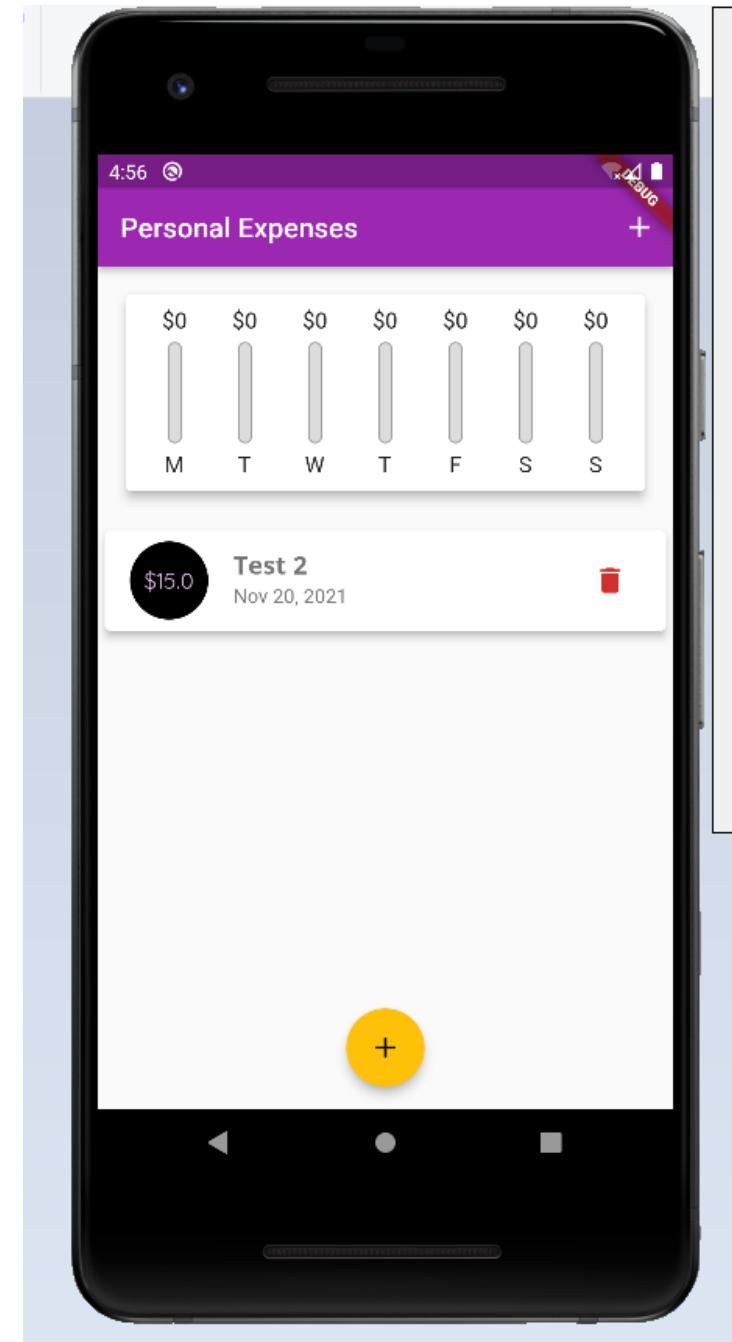
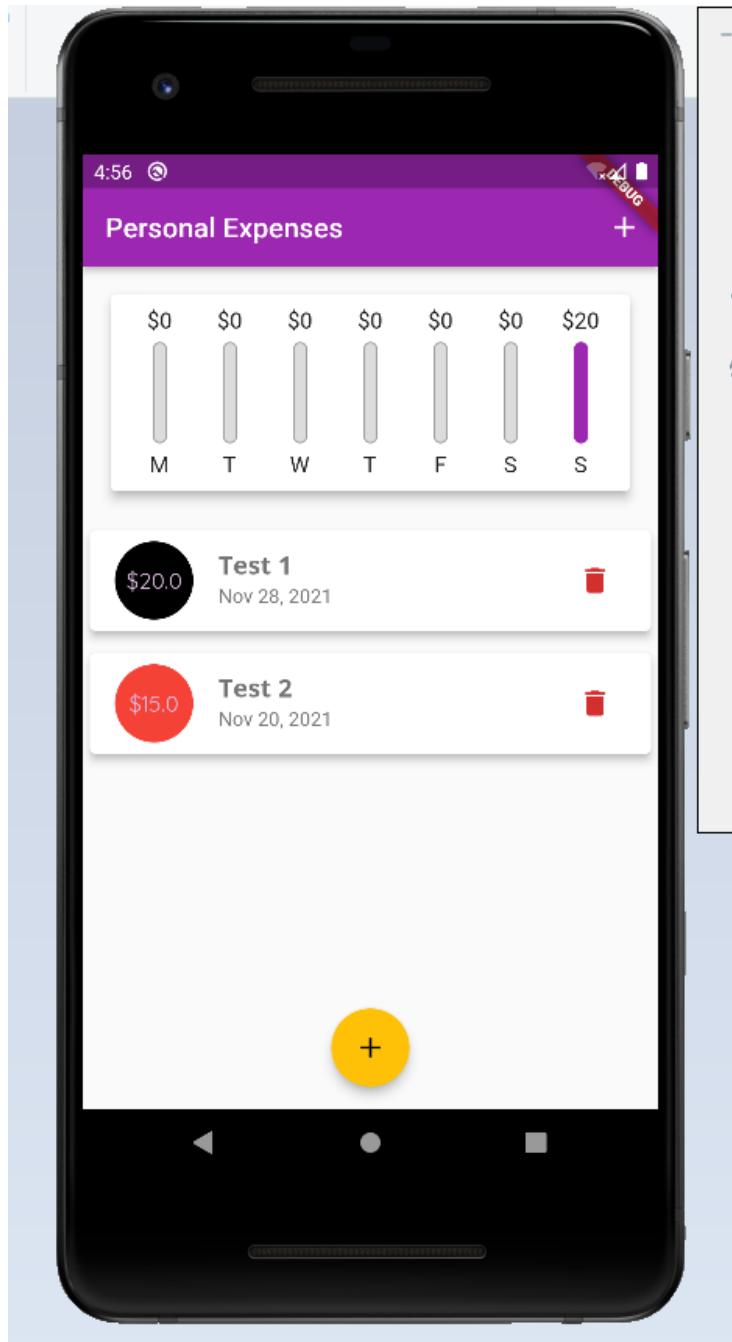
OPEN EDITORS lib > widgets > transaction\_item.dart > \_TransactionItemState > build

PERSONAL\_EXPENSES\_04 .dart\_tool .idea android assets build ios lib models transaction.dart widgets adaptive\_flat\_button.dart chart\_bar.dart chart.dart new\_transaction.dart transaction\_item.dart transaction\_list.dart user\_transactions.dart main.dart test web .gitignore .metadata packages

```
59     style: Theme.of(context).textTheme.headline1,
60   ), // Text
61   subtitle: Text(
62     DateFormat.yMMMd().format(widget.transaction.date),
63   ), // Text
64   trailing: MediaQuery.of(context).size.width > 460
65   ? FlatButton.icon(
66     icon: const Icon(Icons.delete),
67     label: const Text('Delete'),
68     textColor: Theme.of(context).errorColor,
69     onPressed: () => widget.deleteTx(widget.transaction.id),
70   ) // FlatButton.icon
71   : IconButton(
72     icon: const Icon(Icons.delete),
73     color: Theme.of(context).errorColor,
74     onPressed: () => widget.deleteTx(widget.transaction.id),
75   ), // IconButton
76   ), // ListTile
77 ); // Card
78 }
79 }
80 }
```

widgets\transaction\_item.dart

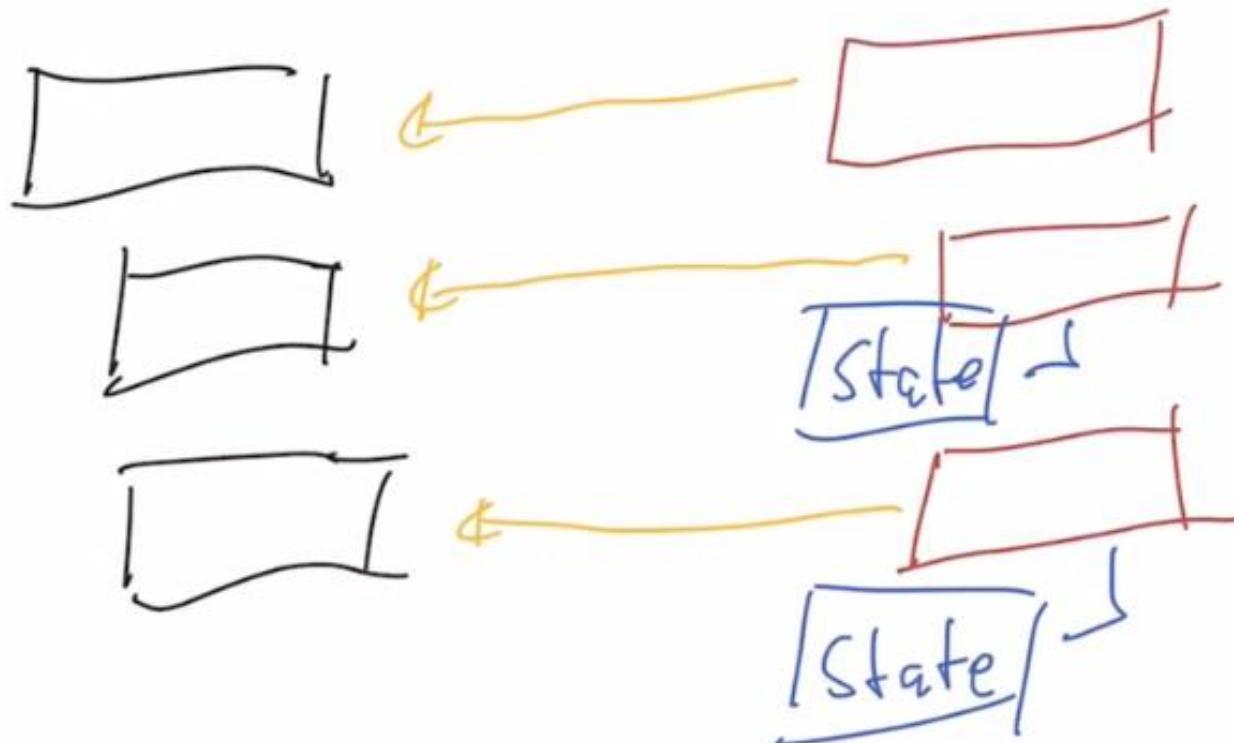
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# **UNDERSTANDING THE PROBLEM**

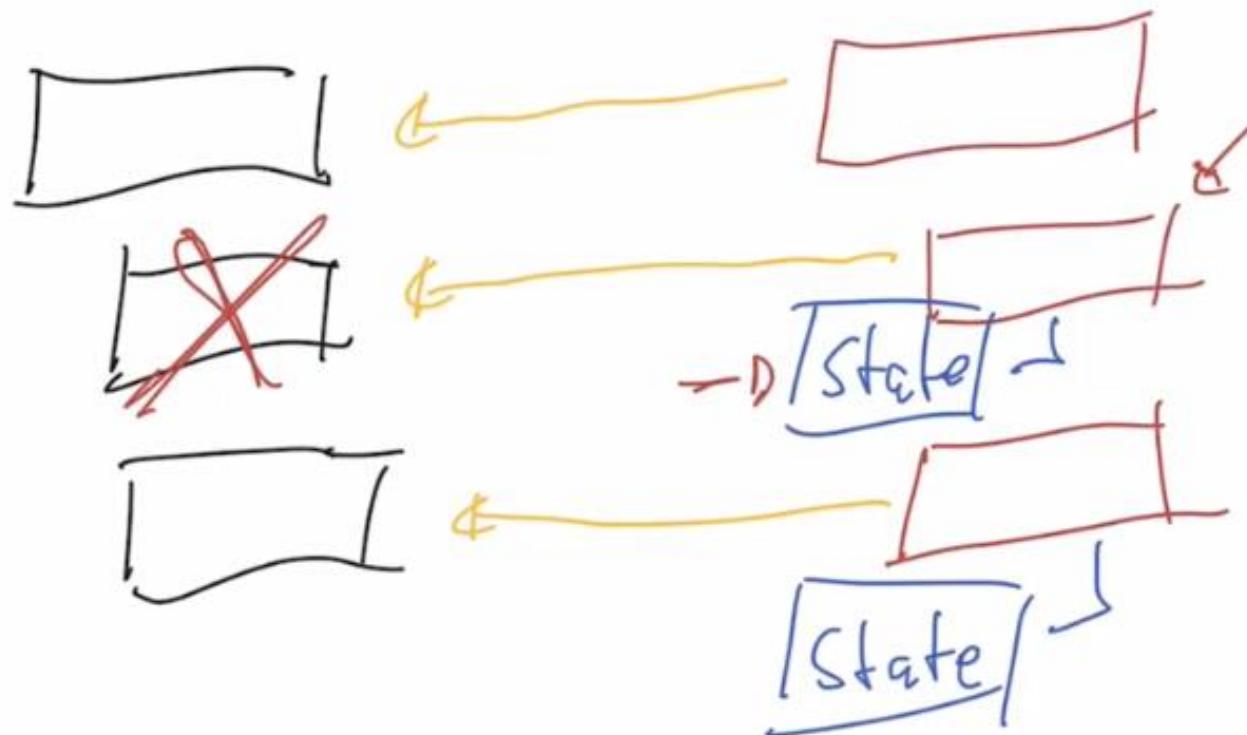
Widget

Element

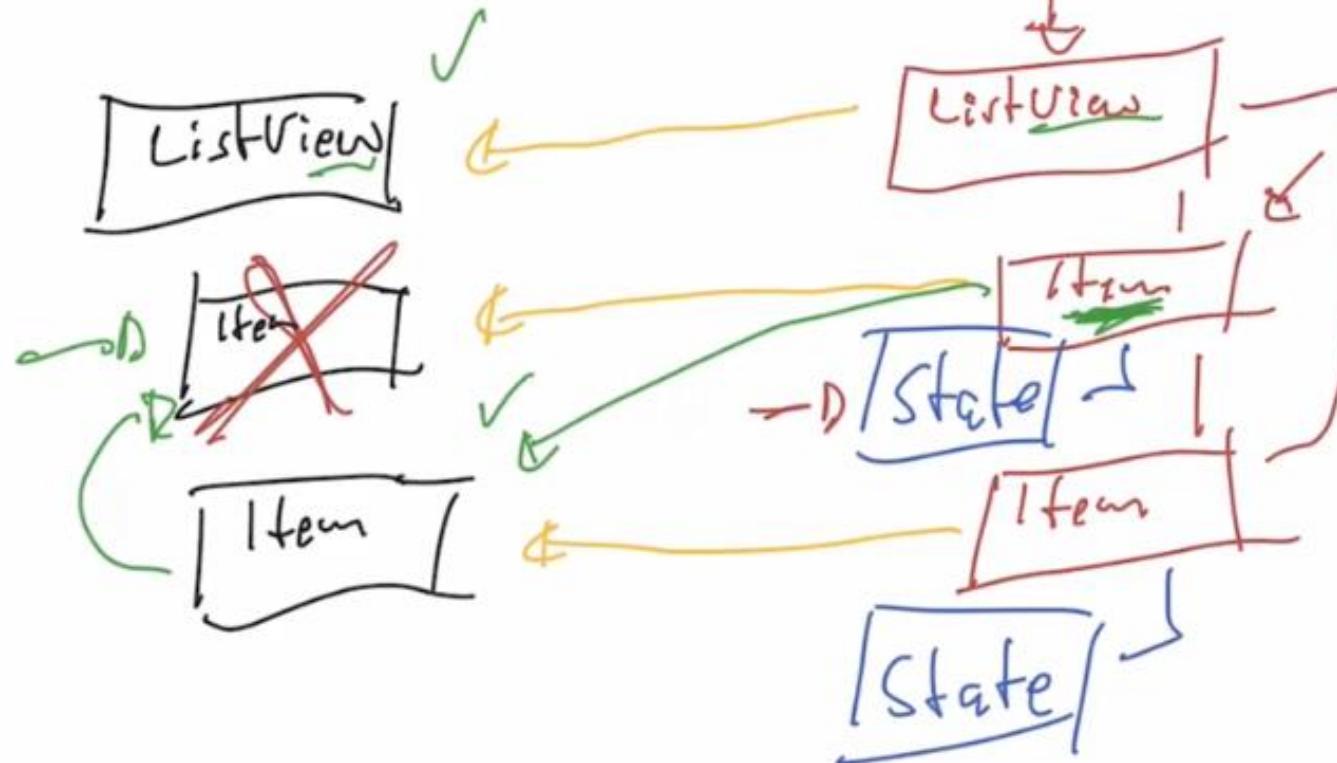


Widget

Element



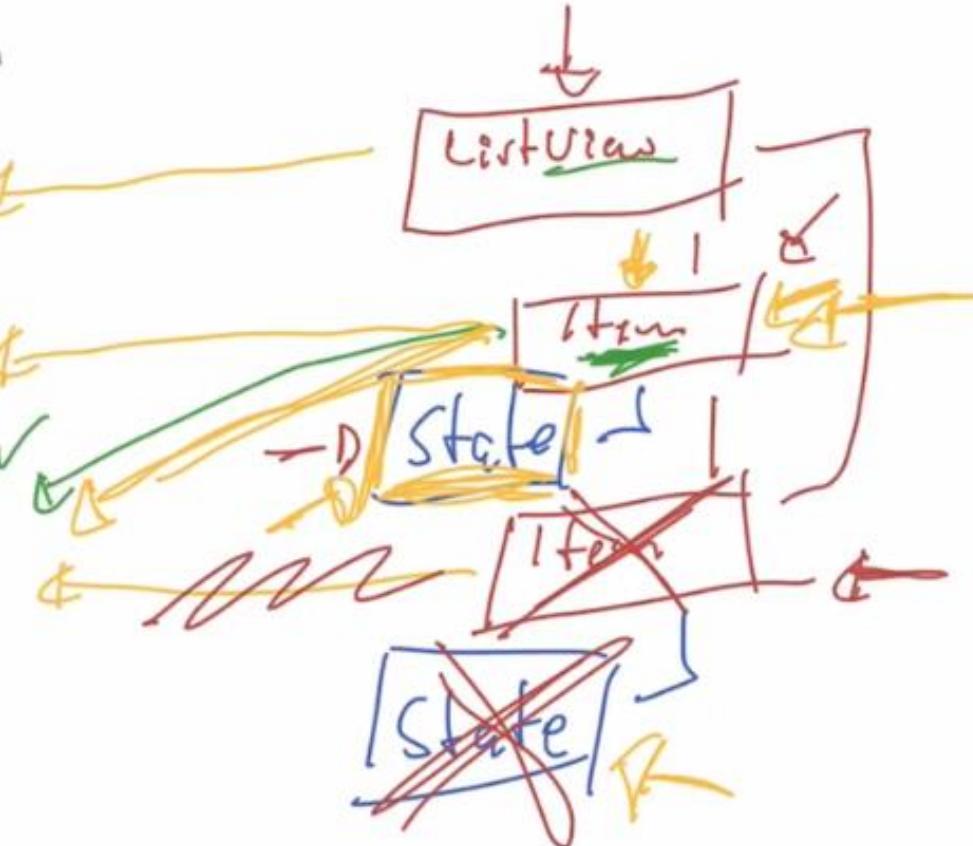
Widget



Widget



Element



# USING KEYS

File Edit Selection View Go Run Terminal Help transaction\_list.dart - personal\_expenses\_04 - Visual Studio Code

EXPLORER ... main.dart transaction\_item.dart chart\_bar active\_flat\_button.dart new\_transaction.dart transaction\_list.dart X

OPEN EDITORS lib > widgets > transaction\_list.dart > TransactionList > build

transaction\_list.dart lib\w...

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PERSONAL\_EXPENSES\_04 .dart\_tool .idea android assets build ios lib models transaction.dart widgets adaptive\_flat\_button.dart chart\_bar.dart chart.dart new\_transaction.dart transaction\_item.dart transaction\_list.dart user\_transactions.dart main.dart test web .gitignore .metadata packages

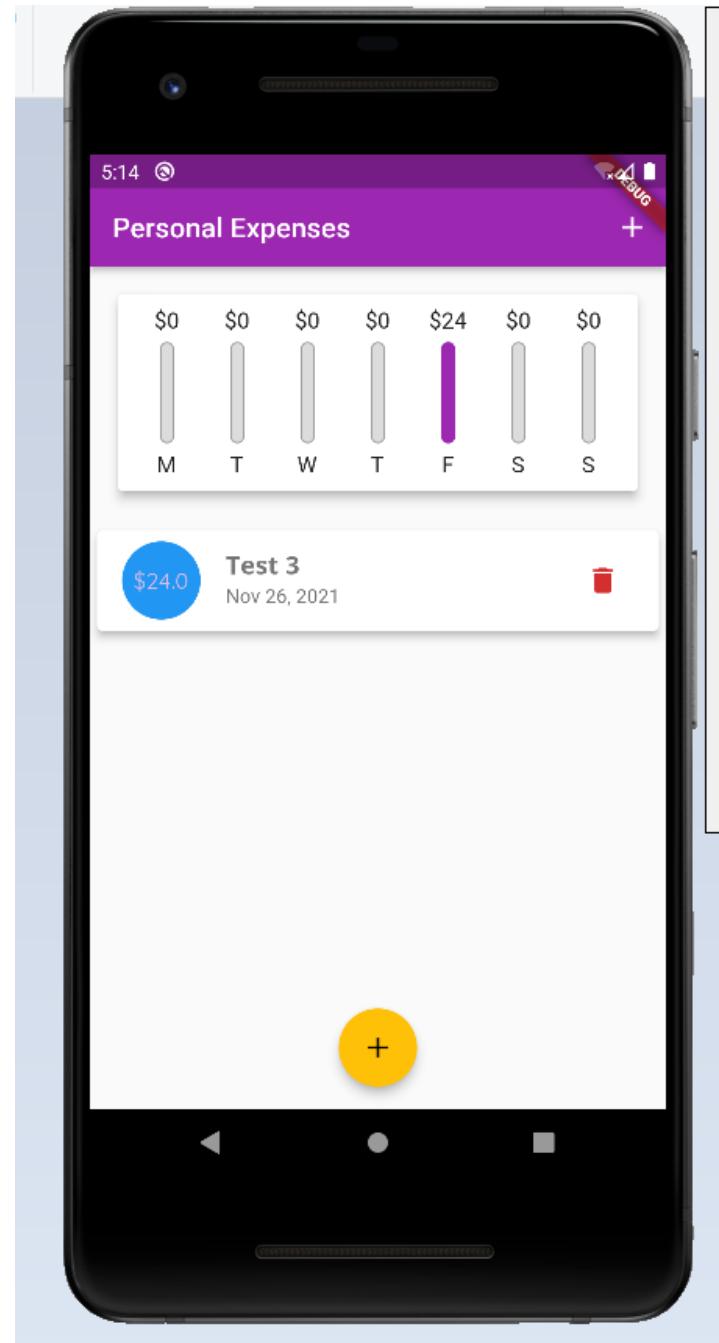
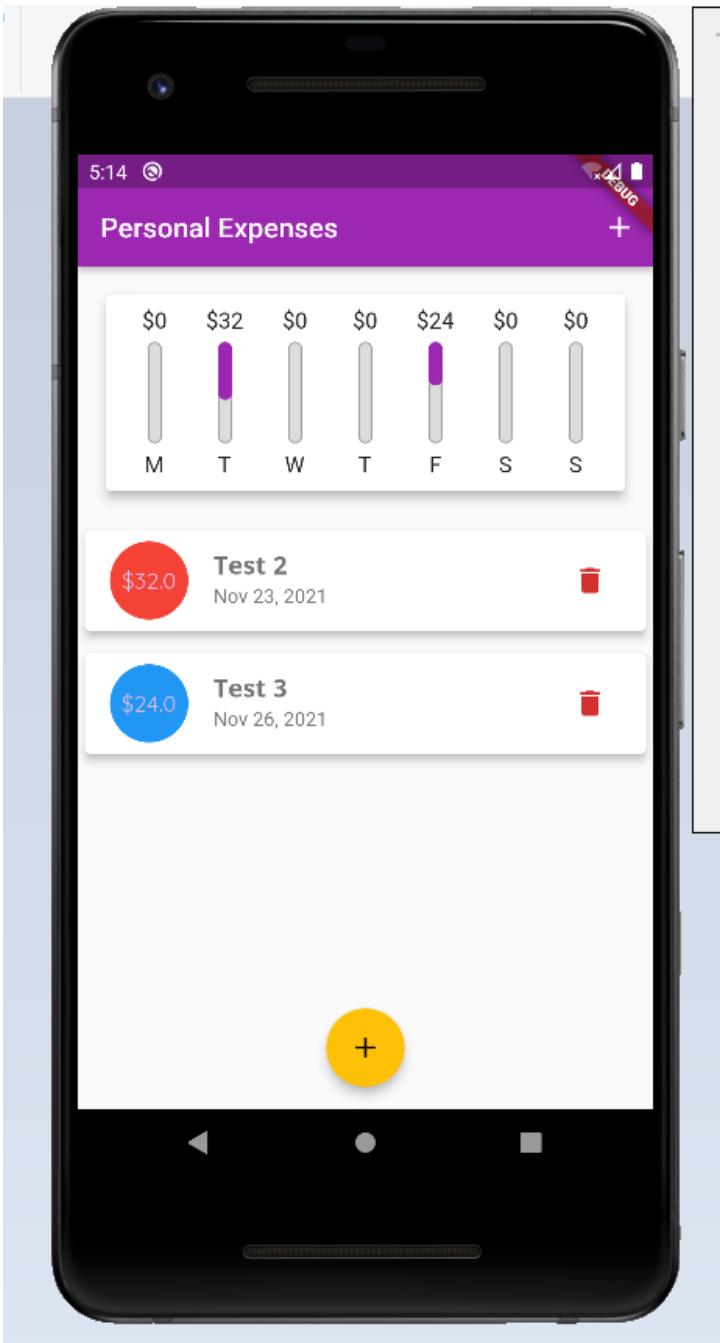
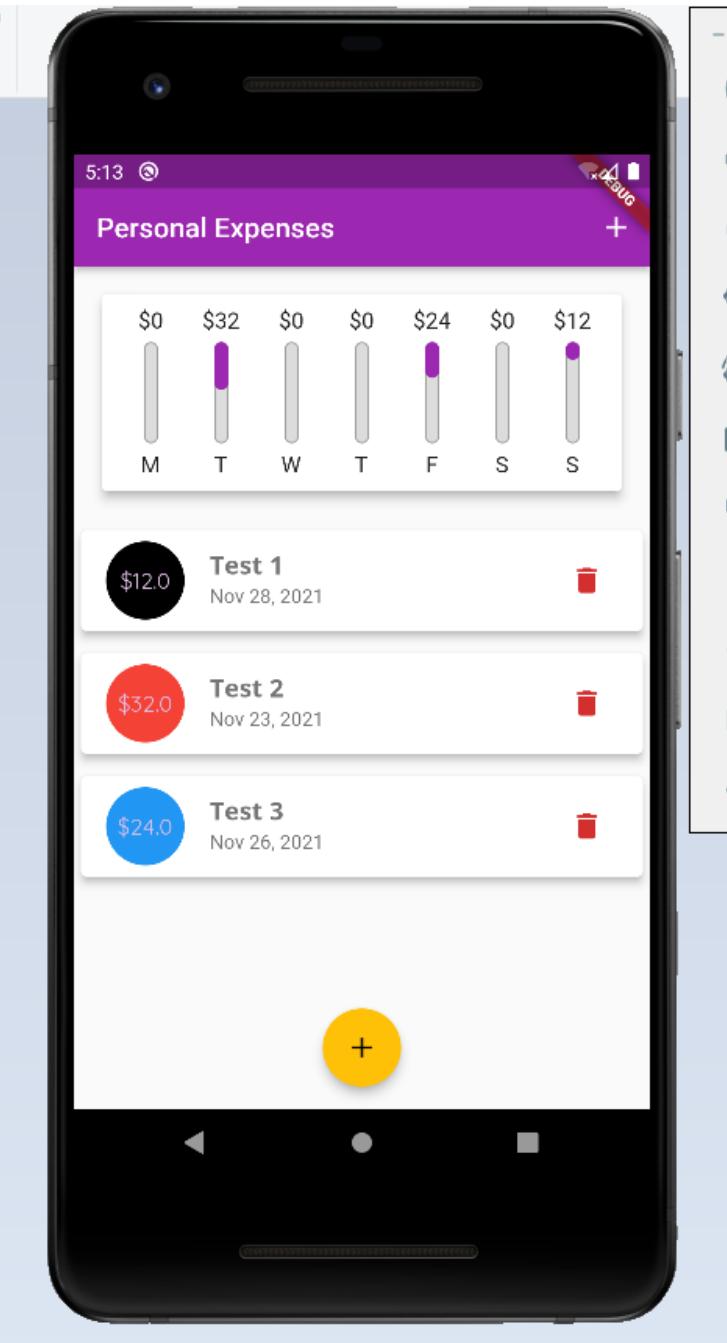
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transaction\_list.dart lib\w...

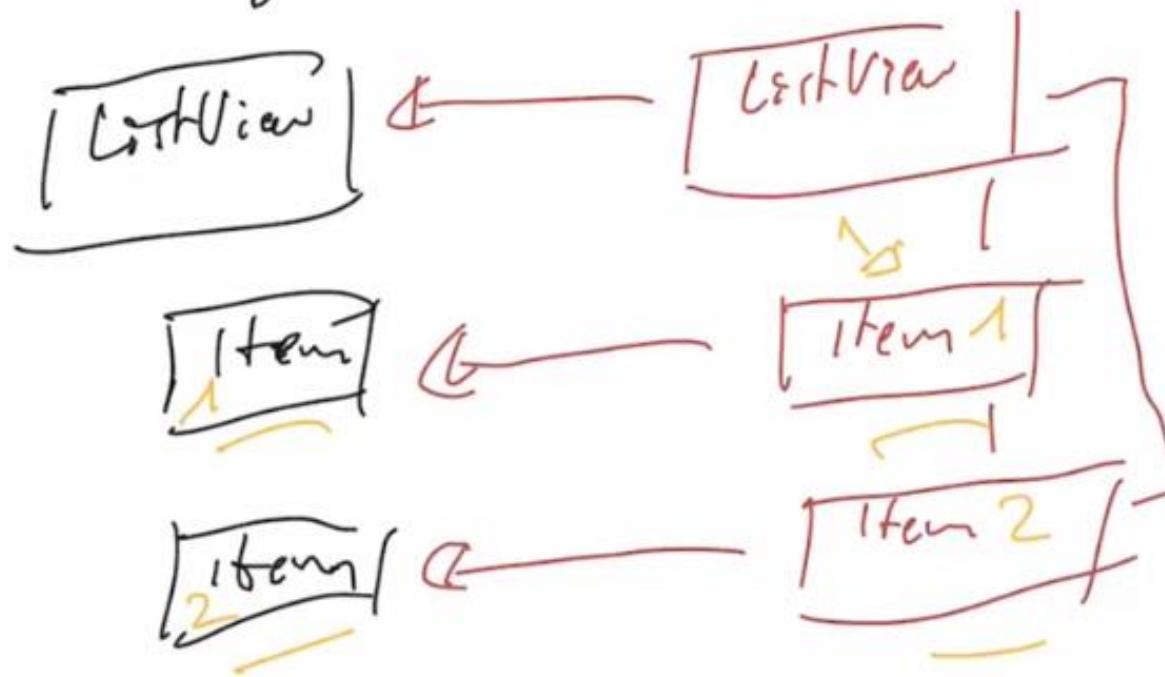
Container( height: constraints.maxHeight \* 0.6, child: Image.asset( 'assets/images/waiting.png', fit: BoxFit.cover, ), // Image.asset // Container ], // <Widget>[] ); // Column ) // LayoutBuilder : ListView( children: transactions .map((tx) => TransactionItem( key: ValueKey(tx.id), transaction: tx, deleteTx: deleteTx, )) // TransactionItem .toList(), ); // ListView }

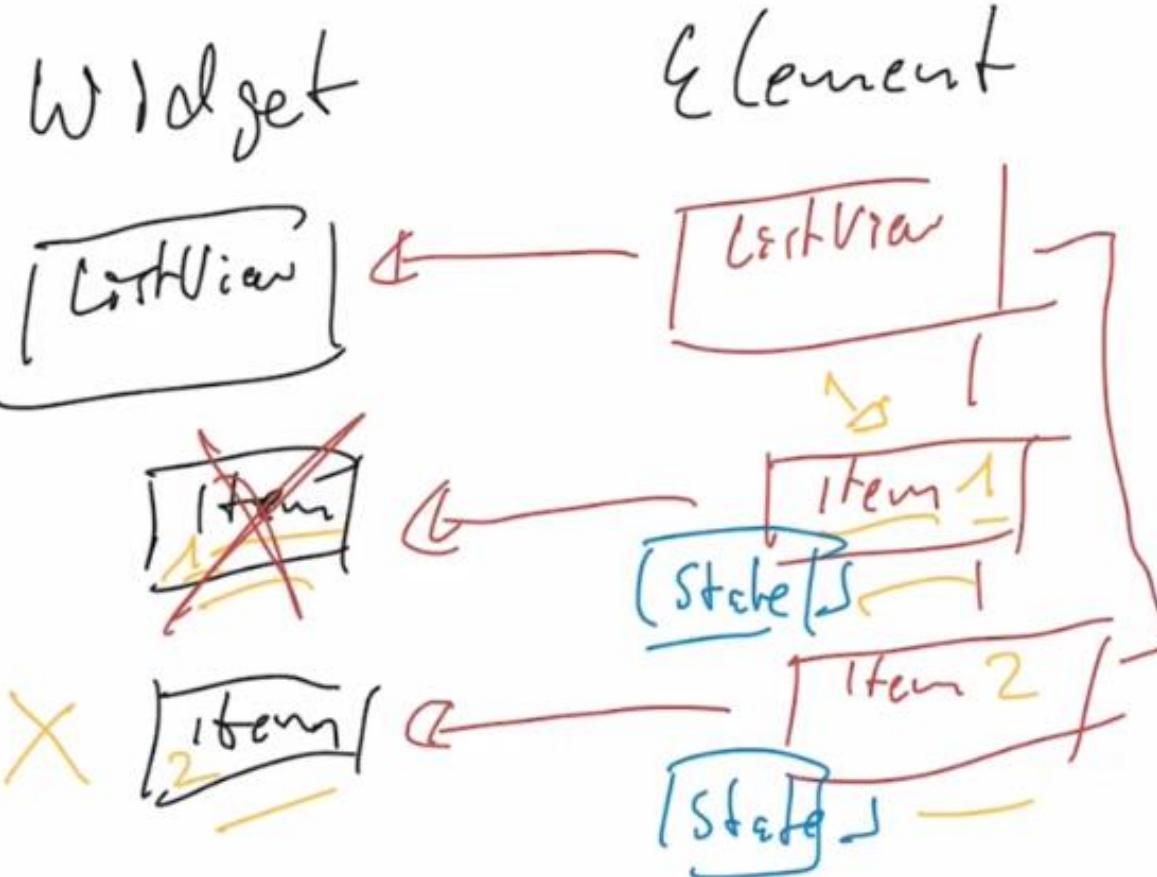
windows\transaction\_list.dart

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# Widget Element





Widget      Element

