UNIVERSITY OF PADOVA
DEPARTMENT OF INFORMATION ENGINEERING

Biomedical Wearable Technologies for Healthcare and Wellbeing

Navigation

A.Y. 2021-2022

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Outline

- **Recap**
- Navigator
- Navigate to a new screen and back
- Named routes
- Passing argument to a named routes
- Returning an argument from a named route

- Exercise
- Homework
- Resources

Recap

Lesson 1 ✓
Collaborate and version code

Lesson 2/3 ✓
Get familiar with Dart

Lesson 4 ✓
Understand Flutter's principles

Lesson 5 ✓
Create a layout

Lesson 6
Navigate between screens

Lesson 7
Manage the app state

Milestone #1

Lesson 8
Make simple API calls

Lesson 9
Fetch wearable data

Milestone #2

Lesson 10
Implement user authentication

Lesson 11
Persist user data

Lesson 12
Advanced stuff

Milestone #3

Do something with your fantasy

Outline

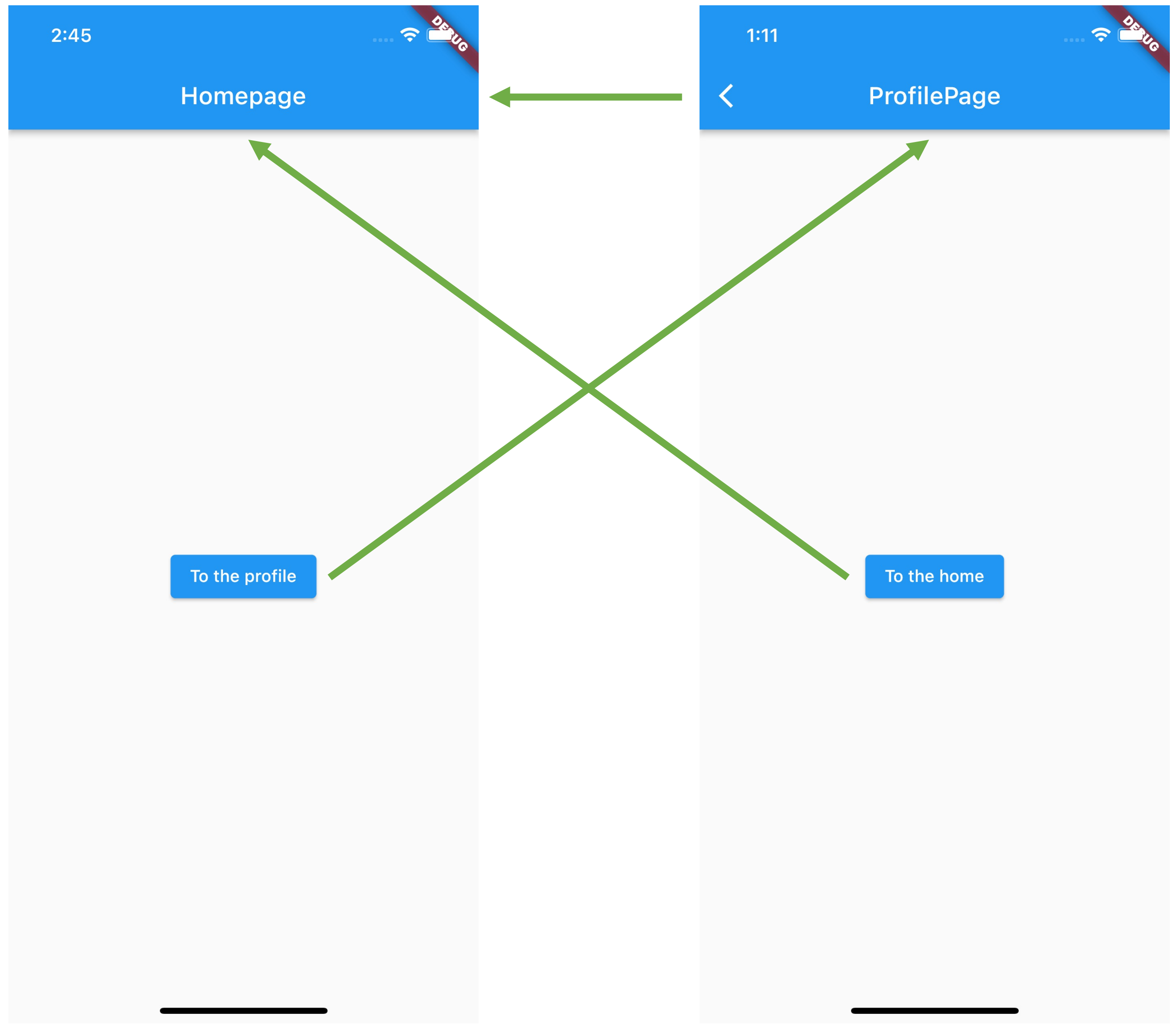
Navigator

- In general, apps are made of multiple screens (called **routes**)
- How to navigate through routes?
- How to pass things to routes and get values back from them?
- `Navigator` is a special class that allows to manage all of this

Outline

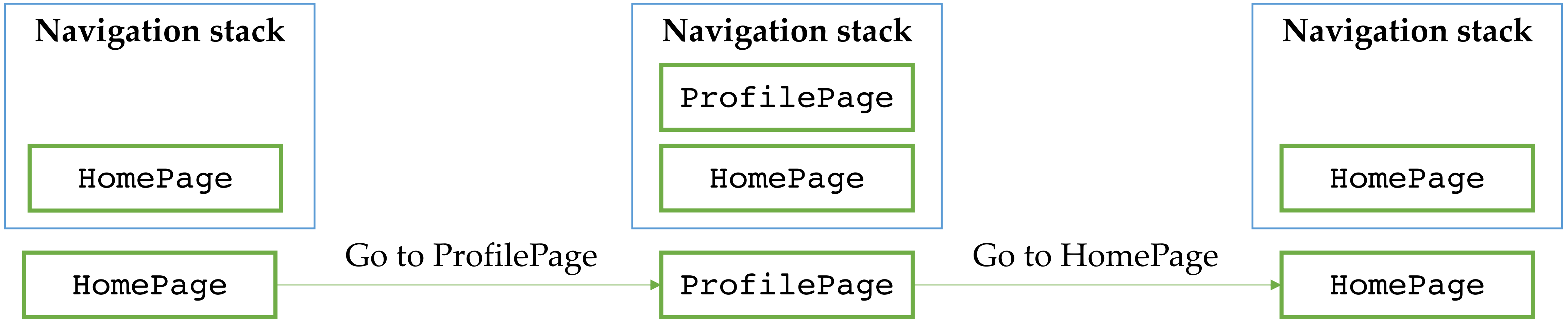
Navigator basics

- First let's see how to move between two routes
- We will start from creating a simple two-routes app where the first route will act as homepage and the second will represent the route that will ideally contain the info on the user profile.
- When the user taps the button on the homepage it will be directed to the profile page and viceversa



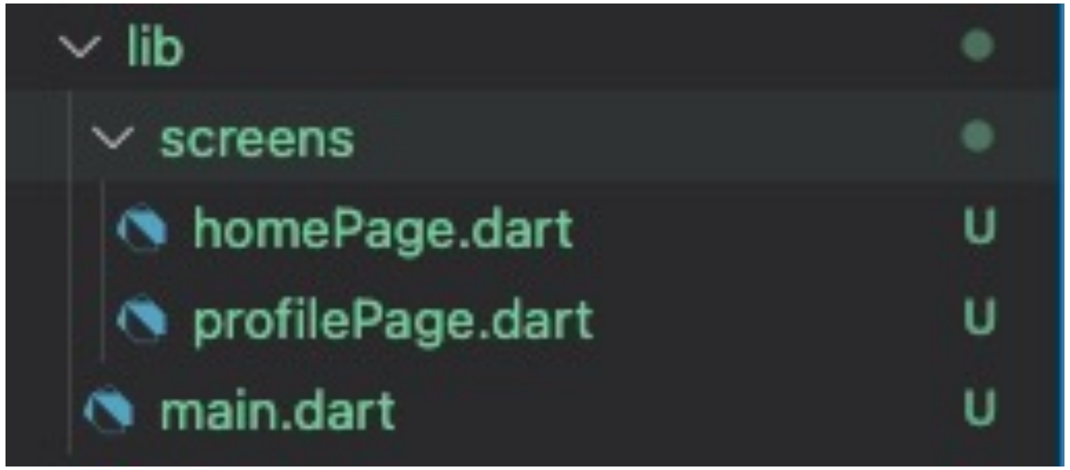
Navigator rationale

- `Navigator` is in charge of managing the navigation through the app
- To do so, `Navigator` uses a **stack-like structure**. The user sees the "top" of the stack
- When you go to a new route, you are "pushing" it into the stack
- When you go back, you are "popping" the route out of the `Navigator`



Navigator basics - Preparation

- Create a new project called ‘there_and_back_again’
- Create the `lib/screens/` folder
- Create two files in the `lib/screens/` folder just created and rename them as ’homePage.dart’ and ‘profilePage.dart’
- The project `lib` folder should look like this:



```
lib
  screens
    homePage.dart      U
    profilePage.dart   U
  main.dart            U
```

Navigator basics – homePage.dart boilerplate

```
import 'package:flutter/material.dart';
class HomePage extends StatelessWidget {
  const HomePage({Key? key}) :
super(key: key);
  static const routename = 'Homepage';
  @override
  Widget build(BuildContext context) {
    return Scaffold(
      appBar: AppBar(
        title: Text(HomePage.routename),
      ),
      ...
```

```
...
body: Center(
        child: ElevatedButton(
          child: Text('To the profile'),
          onPressed: () {
            //TODO: implement the
navigation
          },
        ),
      ),
    );
  } //build
} //HomePage
```

Navigator basics – profilePage.dart boilerplate

```
import 'package:flutter/material.dart';
class ProfilePage extends StatelessWidget {
  const ProfilePage({Key? key}) :
super(key: key);
  static const routename = 'ProfilePage';
  @override
  Widget build(BuildContext context) {
    return Scaffold(
      appBar: AppBar(
        title: Text(HomePage.routename),
      ),
      ...
```

```
...
body: Center(
        child: ElevatedButton(
          child: Text('To the home'),
          onPressed: () {
            //TODO: implement the
navigation
          },
        ),
      ),
    );
  } //build
} //ProfilePage
```

Navigator basics – main.dart boilerplate

```
import 'package:flutter/material.dart';
import
'package:there_and_back_again/screens/homepage.dart';


void main() {
  runApp(const MyApp());
} //main


class MyApp extends StatelessWidget {
  const MyApp({Key? key}) : super(key: key);
  @override
  Widget build(BuildContext context) {
    return MaterialApp(
      home: HomePage(),
    );
  } //build
}//MyApp
```

Navigator basics – push and pop

- To go to the ProfilePage route, simply invoke `Navigator.push()`:

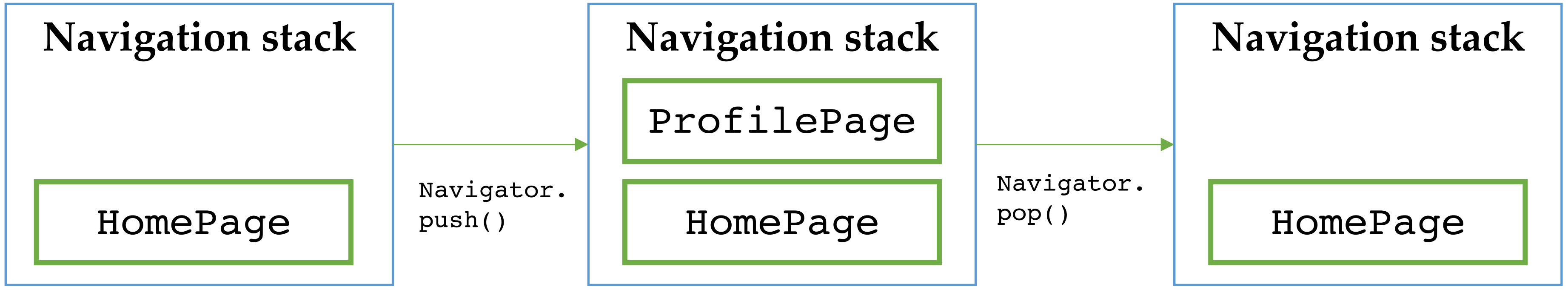
```
...
onPressed: () {
  Navigator.push(context, MaterialPageRoute(builder: (context) => const ProfilePage()));
},
...
```

Current `BuildContext`

The new `MaterialPageRoute` to be pushed into the stack

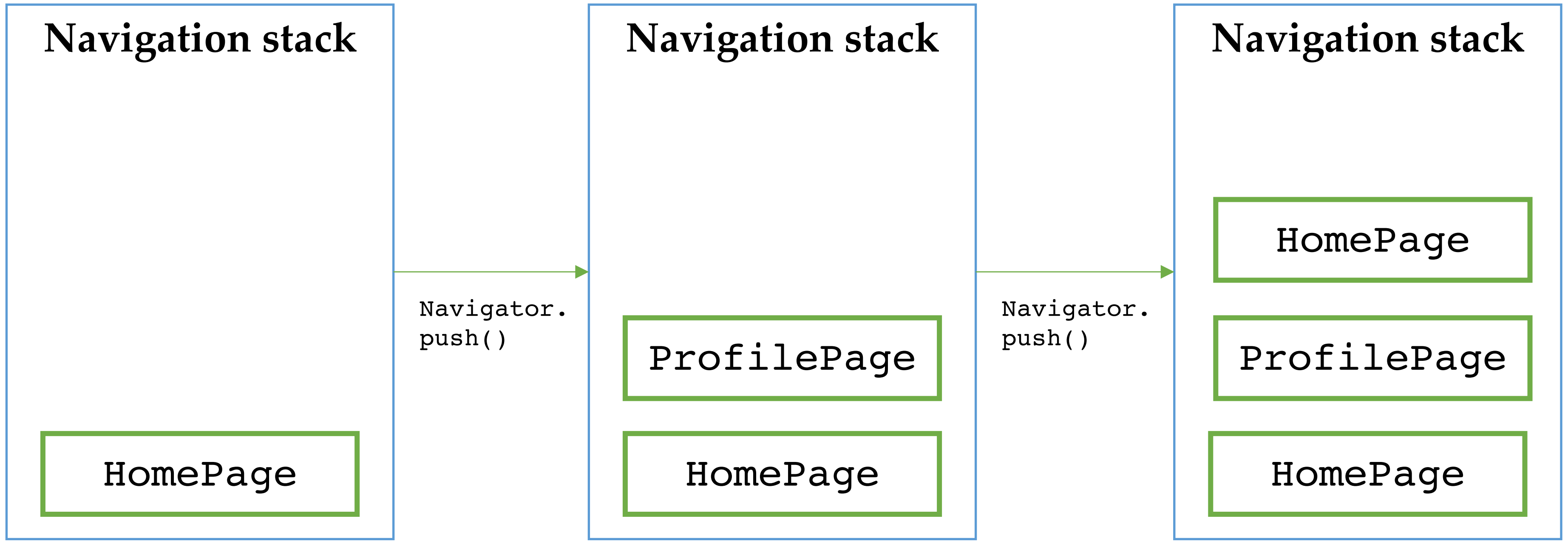
- To pop the ProfilePage route, simply invoke `Navigator.pop()`:

```
...
onPressed: () {
  Navigator.pop();
},
...
```



Navigator basics – push and pop

- Note that you could have used `Navigator.push()` to go back to the `HomePage` but this would have been result:



- Very messy situation. The stack will grow indefinetely

Outline

Another approach: Named routes

- An alternative approach to `Navigator.push()` is `Navigator.pushNamed()`
- This solution consists of **associating names to each route** and use the names for navigation
- My personal opinion: this is a **cleaner approach** that leads to better, more readable code
- Let's see how to go for this approach

Named navigation – Preparation

- If you want to implement this approach, you need to specify, from the beginning, the name of each route.

- This is done via the `initialRoute` and `routes` named parameters of `MaterialApp`:

```
MaterialApp(
   initialRoute: '/',
   routes: {
      '/' : (context) => HomePage(),
      '/profile/': (context) => ProfilePage(),
   },
);
```

This specifies the app entry point

This maps names to the corresponding routes within the app

Named navigation – pushNamed

- To go to the `ProfilePage` route, now you can invoke `Navigator.pushNamed()`:

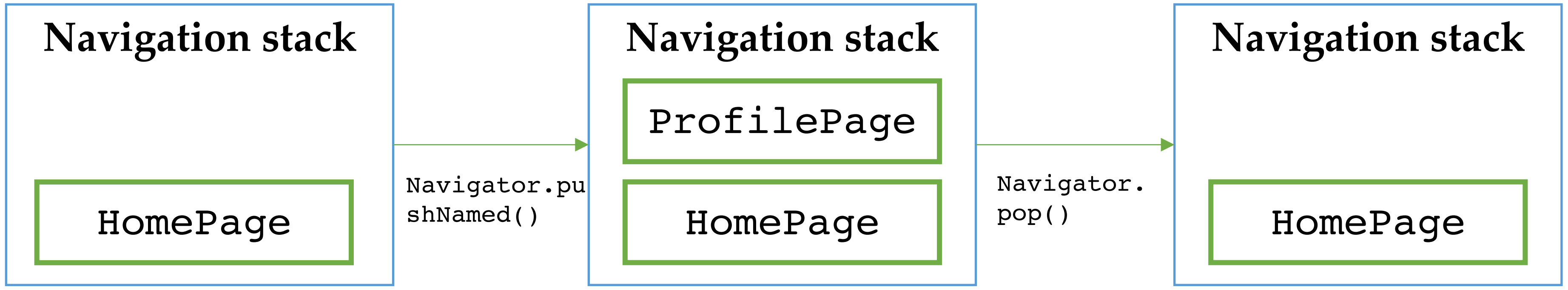
```
...
onPressed: () {
  Navigator.pushNamed(context,'/profile/');
},
...
```

Current `BuildContext`

The name of the route to be pushed into the stack

- To pop the `ProfilePage` route, you can still use `Navigator.pop()`:

```
...
onPressed: () {
  Navigator.pop();
},
...
```



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- **Passing argument to a named routes**
- Returning an argument from a named route

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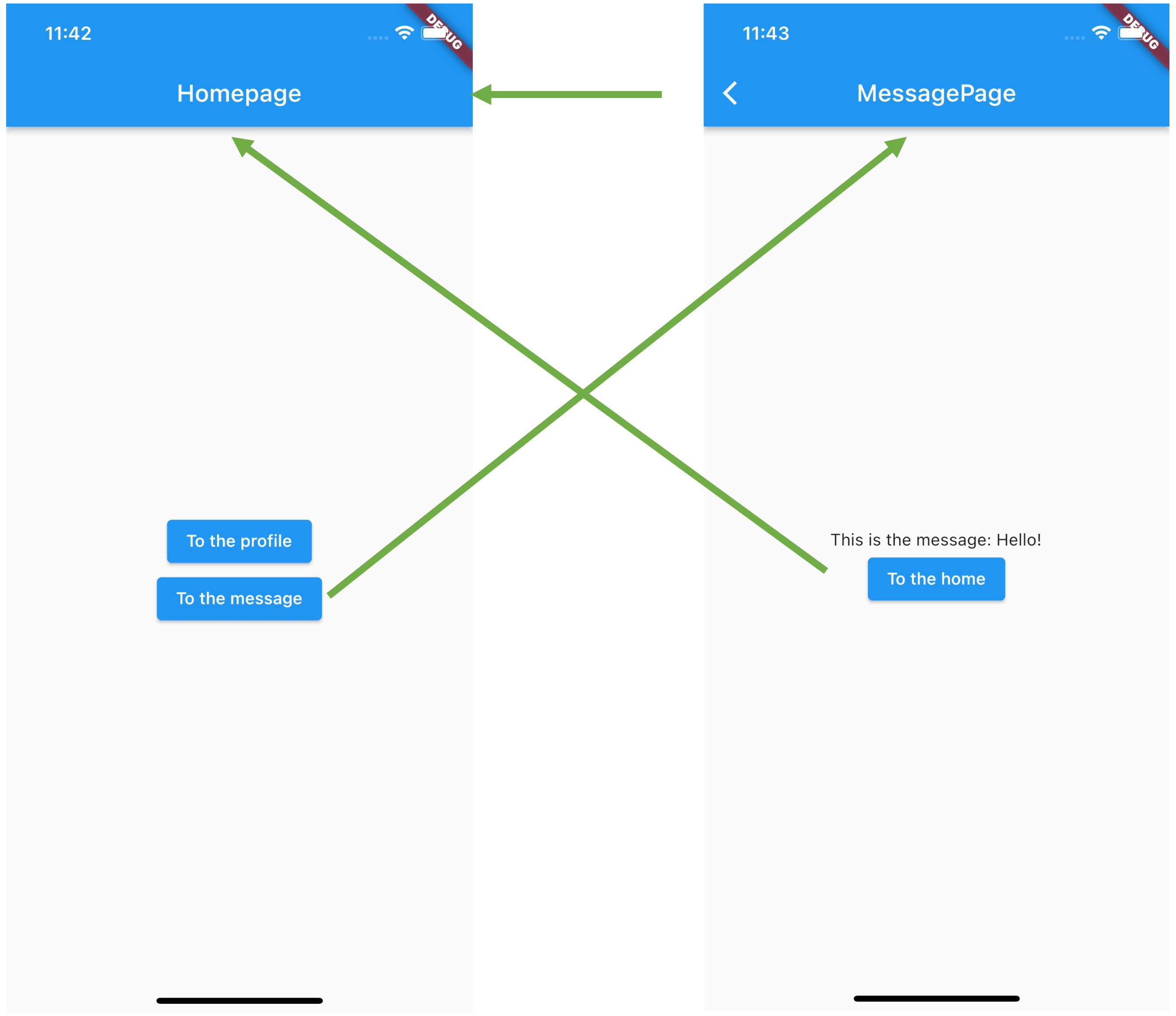
Navigator – Passing an argument

- It is (of course) possible to pass arguments to the new route that can be used for several purposes.
- To demonstrate how, let’s expand the app with another route `MessagePage` that will get an argument from the `HomePage` and will show it in the center of the screen.



Passing arguments – messagePage.dart boilerplate

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

class MessagePage extends StatelessWidget {

  const MessagePage({Key? key}) :
super(key: key);

  static const routename = 'MessagePage';

  @override

  Widget build(BuildContext context) {

    //TODO: get the message from HomePage

    return Scaffold(

      appBar: AppBar(

        title: Text(MessagePage.routename),

      ),

      ...
```

```
...
body: Center(
        child: Column(
          mainAxisAlignment:
MainAxisAlignment.center,
          children: [
            Text(''), //TODO: put the message
inside the Text here
            ElevatedButton(
              child: Text('To the home'),
              onPressed: () {
                Navigator.pop(context);
              },
            ),
          ],
        ),
      ),
    );
  } //build
} // MessagePage
```

Passing arguments – Add the new route and UI

➢ New route? Let’s add it to the list:

```
MaterialApp(
  initialRoute: '/’,
  routes: {
    '/' : (context) => HomePage(),
    '/profile/': (context) => ProfilePage(),
    ‘/message/': (context) => MessagePage(),
  },
);
```

➢ To do: add a button in the `HomePage` to navigate to `MessagePage`

Passing arguments

- To pass an argument to the `MessagePage` route, now you can invoke `Navigator.pushNamed()` as:

```
...
onPressed: () {
  Navigator.pushNamed(context,’/message/’, arguments: ‘Hello!’);
},
...
```

Current `BuildContext`

The name of the route to be pushed into the stack

The arguments to be passed

- Note that you can pass ANYTHING as argument, not just a `String`.

Retrieving arguments

- To retrieve the argument from the `MessagePage` route side you can use a `ModalRoute` as:

```
...
final message = ModalRoute.of(context)!.settings.arguments! as String;
...
```

To figure out what this is, you can imagine that as a utility that stands between the prevoius route (here `HomePage`) and the current one (here `MessagePage`). For details see: https://api.flutter.dev/flutter/widgets/ModalRoute-class.html

We put the `!` here to force the non-null type.

Arguments is an `Object?` But you know this is a `String`, so parse it explicitely!

- Then we display the retrieved argument by simply:

```
...
Text('This is the message: $message’),
...
```

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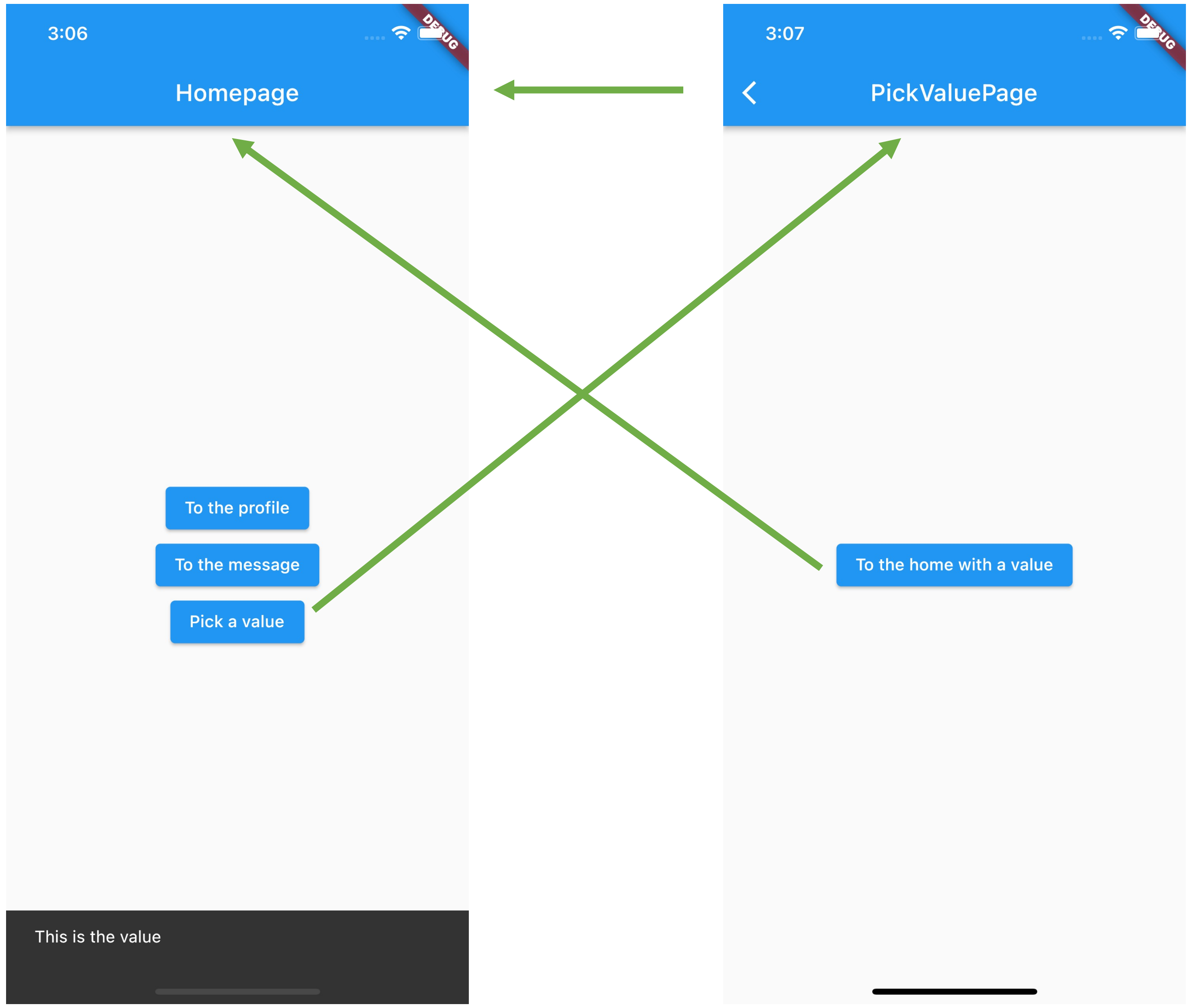
Navigator – Returning data

- It is (of course) also possible to return data from a route.
- To demonstrate how, let's expand the app with another route `PickValuePage` that will provide a value to the `HomePage` which will be in charge of showing it via a `ScaffoldMessenger`.



This is the value

Returning data – pickValuePage.dart boilerplate

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

class PickValuePage extends StatelessWidget {

  const PickValuePage({Key? key}) :
super(key: key);

  static const routename = ‘PickValuePage';

  @override

  Widget build(BuildContext context) {

    return Scaffold(

      appBar: AppBar(

        title: Text(PickValuePage.routename),

      ),

      ...
```

```
...

body: Center(

        child: ElevatedButton(

          child: Text('To the home'),

          onPressed: () {

            //TODO: implement the
navigation + return the data

          },

        ),

      ),

    );

  } //build

} //PickValuePage
```

Returning data – Add the new route

- New route? Let's add it to the list:

```
MaterialApp(
  initialRoute: '/',
  routes: {
    '/' : (context) => HomePage(),
    '/profile/': (context) => ProfilePage(),
    '/message/': (context) => MessagePage(),
    '/pickValue/': (context) => PickValuePage(),
  },
);
```

Returning arguments

- To return an argument to the `HomePage` route, you can invoke `Navigator.pop()` as:

```
...
onPressed: () {
  Navigator.pop(context, 'This is the value');
},
...
```

The value that will return to the `HomePage` once `PickValuePage` is popped out from the stack

- Note that you can return ANYTHING, not just a `String`.

Returning arguments

- To get the result, the `HomePage` must be patient and *await* for it::

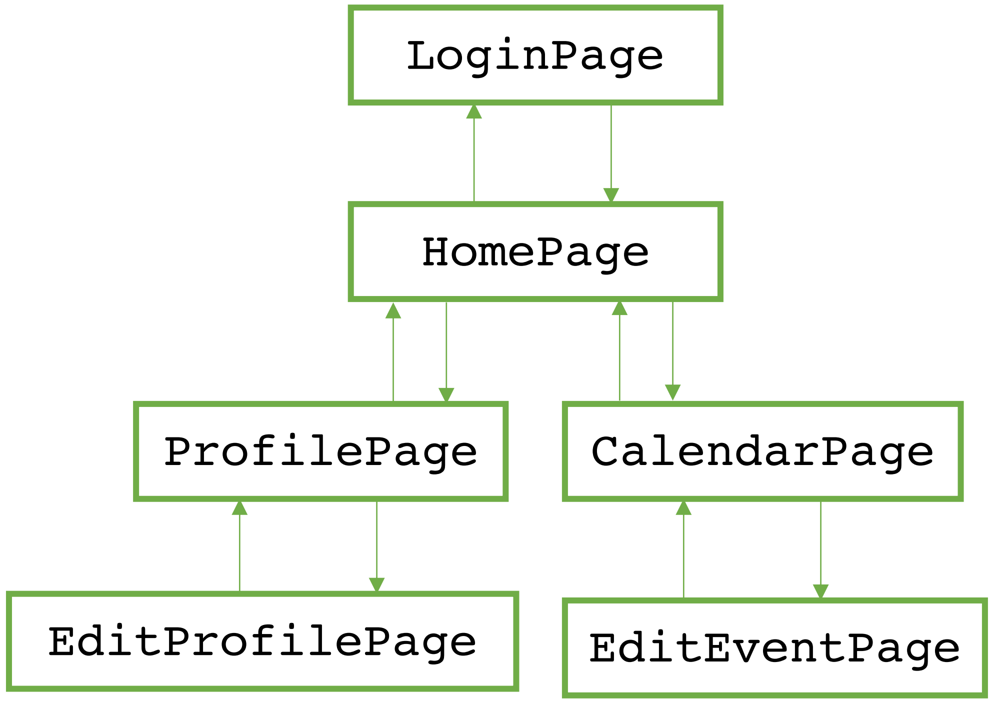
Await means async stuff. The `onPressed` function become asynchronous as well so…

```
...
onPressed: () async {
  final result = await Navigator.pushNamed(context, '/pickValue/');
  ScaffoldMessenger.of(context)
    ..removeCurrentSnackBar()
    ..showSnackBar(SnackBar(content: Text('$result')));
},
...
```

Outline

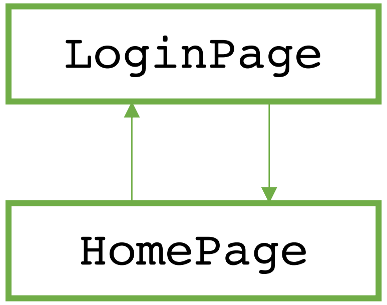
Exercise

- Exercise 06.01 (easy)
  - Create a new project 'reproduce_structure'
  - Reproduce the app navigation structure on the right using the named routing approach.



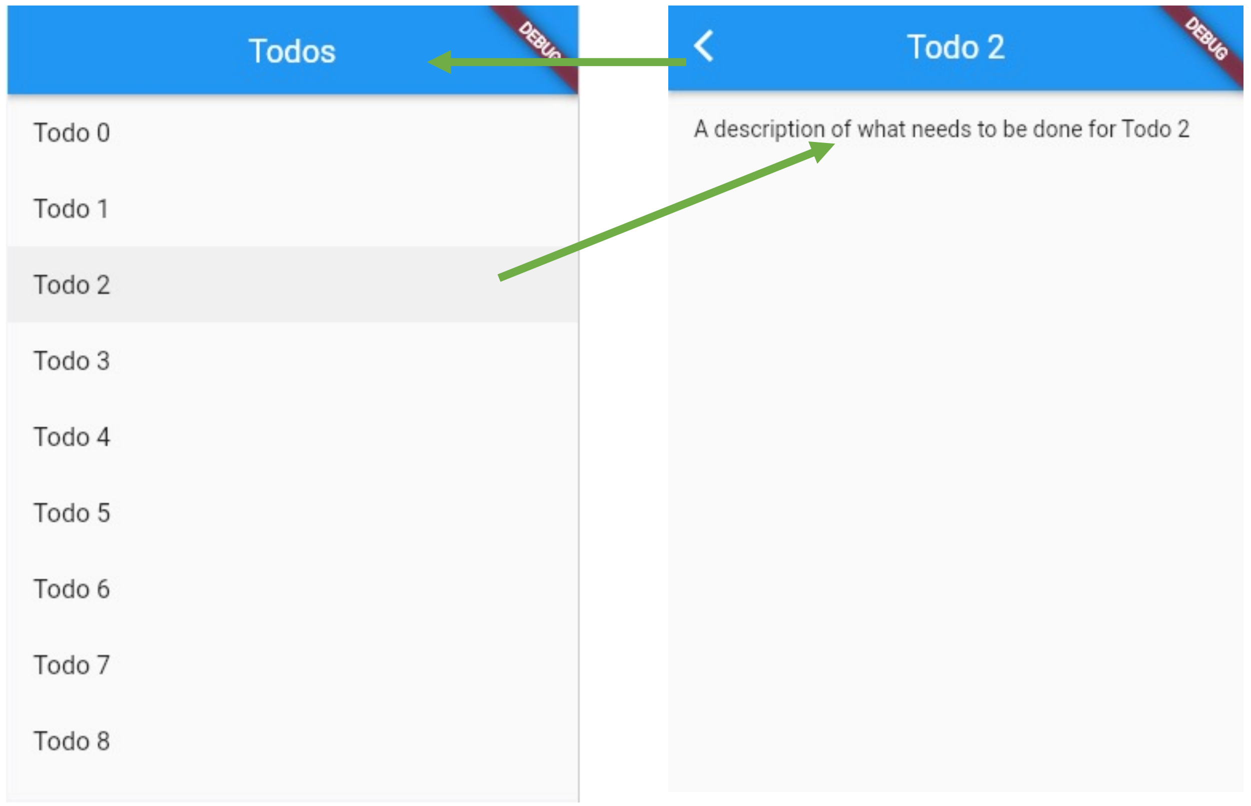
Exercise

- Exercise 06.02 (medium)
  - Create a new project 'login_flow'
  - Reproduce the app navigation structure on the right using the named routing approach.
  - The login page consists of a form with two textboxes (one for the username and the other for the password) and a button. Hint: you can use the widgets
  - When the user types "bug@expert.com" in the username textbox and "5TrNgP5Wd" in the password textbox, and taps the button, the user is redirected to the Homepage. If the credentials are wrong, a `ScaffoldMessenger` is showed for 2 seconds saying "Wrong credentials".
  - The `HomePage` must show the provided username.



Exercise

- Exercise 06.03 (medium)
  - Follow the cookbook https://docs.flutter.dev/cookbook/navigation/passing-data by the Flutter team to learn how to pass data to a route directly to its constructor.
  - (solution available from the Flutter team in the cookbook)



Outline

Homework

- Get familiar with Navigator

Outline

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Resources

- Navigation Recipes
  - https://docs.flutter.dev/cookbook/navigation