



# Mobile App Dev



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## ***Installation***

1. Go to <https://docs.flutter.dev/get-started/install/>
  2. Choose your operating system.
  3. Choose the platform and follow procedure.
  4. move the zip file to a folder in c : drive.
  5. Extract the zip file.
  6. Update windows path variable.
  7. Run **flutter doctor** on the cmd.
- 

## ***Creating a project***

**command:** flutter create [project name]

project name cannot use upper case letters

running the project:

**command:** flutter run

Open the folder in vs code.

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## ***Keywords***

1. **Integer** - any positive or negative non-decimal number
  2. **Double** - decimal numbers
  3. **void** - no return value when used as func return type
  4. **dynamic** - takes any datatype
  5. **final** - any variable with final cannot be modified and is called at run time
  6. **const** - any variable with const cannot be modified and is called at compile time
-

# Tasks

## Day 1

- installation
- project creation
- datatypes - string operations
- run the app on chrome and emulator

## Day 2

- Align the column children to main axis center and cross axis center and other orientations
- Create a row widget and load children horizontally
- Draw login screen pages from google and label the widget types

## Day 3

- Login Page design
- Generate the apk file

---

# Dart Programming Language

File extension for dart files is **.dart**

dart language is used to create applications using the flutter framework.

A dart file should have a **void main(){}** function that is the entry point of the program.

To print on the console, we use the **print()** function.

Every line of code or statement should end in a semicolon ( ; )

```
void main(){  
    print("Hello World");  
}
```

The above code prints “Hello World” on the console.

## **Datatypes**

There are 7 datatypes in dart, they are:

### **1. Numbers**

In dart, numbers are used to represent numeric literals.

### **2. Strings**

It is used to represent a sequence of characters. It is a sequence of UTF-16 code units. The keyword string is used to represent string literals. String is a collection of characters enclosed in single, double or triple quotes.

String str1 = “ ABC|abc ”;

**string in-built methods:**

toUpperCase() → str1.toUpperCase() → “ ABC|ABC ”

toLowerCase() → str1.toLowerCase() → “ abc|abc ”

trim() → str1.trim() → “ABC|abc”

trimLeft() → str1.trimLeft() → “ABC|abc ”

trimRight() → str1.trimRight() → “ ABC|abc”

split() → str1.split("|") → [” ABC”, “abc ”]

### **3. Booleans**

True or False values

bool isTrue = true;

```
bool isFalse = false;
```

## 4. Lists

List is a collection of objects separated by commas and enclosed in square brackets.

[1, 23, 69, 7, 10] is a list of numbers or integers.

Every element is positioned with an index number. Indices start with 0 for the first element.

### syntax:

```
List<DataType> ListName = [element1, element2, element3, element4];
```

if you give the datatype as **dynamic**, it can take any datatype and be a heterogenous list.

### functions:

```
void main(){
    // declaration of studentNames list
    List<String> studentNames = ["safwan"];

    studentNames.add("mohammed");    // adds an element to the list
    studentNames.addAll(["jswanth", "chakradhar"]);    // adds multiple elements
    studentNames.insert(2, "deva");    // adds "deva" to index 2
    studentNames.removeAt(2);    // removes element from index 2
    studentNames.remove("mohammed");    // removes "mohammed" element

    // printing using index
    print(studentNames[0]);
    print(studentNames[3]);
    print(studentNames.first);
    print(studentNames.last);
}
```

```
studentNames.clear(); // removes all elements from the list  
}
```

## 5. Maps

The map object is a key value pair. Keys and values on a map may be of any type. It is a dynamic collection. The key always has to be String datatype and unique. Maps are defined with curly braces.

**syntax:** Map<keyDataType, valueDataType> MapName = { };

Map <String, String> students = {};

```
void main(){  
    Map Newmap = new Map();  
    Newmap['First'] = 'Dart';  
    Newmap['Second'] = 'For';  
    Newmap['Third'] = 'Developing apps';  
  
    Map<String, dynamic> students = {  
        "Name" : "Mohammad",  
        "Age" : 18,  
        "Branch" : "CSE"  
    };  
  
    print(Newmap);  
    // output: {'First': 'Dart', 'Second': 'For', 'Third': 'Deve  
  
    print(students);  
    // output: {"Name" : "Mohammad", "Age" : 18, "Branch" : "CSI  
}
```

## 6. Sets

## 7. Runes

### Variables

variable declaration syntax: **[typeOfVariable] [nameOfVariable] = value;**

examples :

```
int num1 = 2;
```

```
double num2 = 1.5;
```

```
bool isRemember = true;
```

When a variable name starts with an underscore ( `_variableName` ), it is set to private access specifier. It cannot be accessed directly outside the local scope. It will need getter and setter methods to manipulate it.

**String concatenation:** to add a variable inside a string we use the dollar ( `$` ) symbol to add more than a variable, the dollar is accompanied with curly braces { }

```
void main(){
    int x = 5;
    print("The value of x is $x");
    print("The upper case of hello is ${'hello'.toUpperCase()}");
}
```

### Functions

A set of statements that perform a specific operation or task. Can be reused by calling the function.

**Syntax :**



```
// basic syntax
returnType functionName(parameters){
    // body of the function
    return value;
}
```

### Examples :

```
// function to print on the terminal
void printValue(){
    print("Hello World");
}
// This function prints "Hello World" everytime it is called
```

```
// function to add two inputed numbers
int addTwoNumbers(int a, int b){
    return a+b;
}
// This function takes in a and b integers as input parameters :
```

Calling the function can be seen below

```
int sum = addTwoNumbers(2, 3);
print(sum);
```

We store the return output in the integer variable sum and print it in the nextline.

## ***Flutter***

Flutter is an open-source UI software development kit created by Google. It is used to develop cross platform applications from a single codebase for any web browser, Fuchsia, Android, iOS, Linux, macOS, and Windows.

Every element in Flutter is considered as a **Widget**. They are classified into two types: **state-ful** and **state-less**. Stateful, meaning that it has a State object (defined below) that contains fields that affect how it looks.

Each screen has a name and it has to be defined with a route. The routes are defined in the main.dart file

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

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

class MyApp extends StatelessWidget {
  const MyApp({super.key});
  @override
  Widget build(BuildContext context) {
    return MaterialApp(
      title: 'Flutter Demo',
      routes : {
        "/login":(context) => const LoginScreen()
      },
      initialRoute: "/login",
      theme: ThemeData(
        colorScheme: ColorScheme.fromSeed(seedColor: Colors.grey),
        useMaterial3: true,
      ),
      // home: const MyHomePage(title: 'Muqabil'),
    );
  }
}
```

To create a new screen, create a new dart file and use the **flutter widget snippet** extension and type the prewritten stateful widget snippet by typing fs. Then add the

route to this new page in the home page after importing it. The **initialRoute** key allows you to specify the page that opens first. Or you can just put "/" in the route name key to make it the initially loaded screen.

## **Container**

The container in Flutter is a parent widget that can contain multiple child widgets and manage them efficiently. It has attributes like:

- Color
- Decoration
- Background color
- Padding
- Margin
- Height and width

Padding is the inner spacing in a container and margin is the exterior spacing in a container. Padding is the space between the border and child elements whereas margin is the space between the border and other neighbouring containers.

The syntax is `Container()` and the properties are enclosed in paranthesis separated with commas. The properties are key: value pairs written with colons.

```
body: Container(  
  color: Colors.amber,  
  height: 500,  
  width: 300,  
  margin: EdgeInsets.all(50),  
  
  // child property  
  child: Text("this is a child container"),  
)
```

## **Text**

Text in Flutter is a widget that can display any written text and modify its size, font weight, font style, color etc.

```
Text(  
  "Hello World",  
  style: TextStyle(  
    fontSize: 35,  
    fontWeight: FontWeight.w600,  
    color: Colors.black,  
  )  
)
```

## **Input text field**

Input text field in Flutter is used to take user input in the form of written text.

## **button**

Buttons in Flutter are used to take user input in the form of clicks.

## **row**

Column widgets in flutter are used for horizontal alignment of its children. It can take multiple widgets and display them horizontally. The main axis in row is X axis and the cross axis is Y axis.

```
Row(  
  children:[  
    Container(  
      color: Colors.blue,  
      width: 300,  
      height: 200  
    ),  
    Container(  
      color: Colors.orange,
```

```

        width: 300,
        height: 200
      ),
      Container(
        color: Colors.black,
        width: 300,
        height: 200
      )
    ]
  )
)

```

## **column**

Column widgets in flutter are used for vertical alignment of its children. It can take multiple widgets and display them vertically. The main axis in column is Y axis and the cross axis is X axis.

There are nine points defined in a column layout. Defined with respect to Main axis and Cross axis as start, centre or end. By default a column is at Main axis start and Cross axis centre. We can change these values.

Main axis and Cross axis also has properties called “spaceAround”, “spaceBetween”, “spaceEvenly”

spaceAround - adds equal spaces between the children and also the borders

spaceEvenly - adds equal spaces between the children containers

spaceBetween - adds equal spaces between the children but no space from the borders

```

Column(
  mainAxisAlignment: MainAxisAlignment.center,
  crossAxisAlignment: CrossAxisAlignment.center,
  children:[
    Container(
      color: Colors.blue,
      width: 300,
      height: 200
    ),
  ],
)

```

```

        Container(
          color: Colors.orange,
          width: 300,
          height: 200
        ),
        Container(
          color: Colors.black,
          width: 300,
          height: 200
        )
      ]
    )
  )
)

```

## List view

...

## Login Page design

Every screen returns a Scaffolding, Scaffolding can have appBar (Top bar), Body and other keys.

Here, we add a container inside the body and define its properties of color, width and height. The color is green, height is 200 and width is taken dynamically from the MediaQuery.

```

import 'package:flutter/material.dart';

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

  @override
  Widget build(BuildContext context) {
    return Scaffold(
      appBar: AppBar(title: Text("Login Screen")),
      body: Container(

```

```

        color: Color.fromARGB(255, 255, 235, 164),
        width: MediaQuery.of(context).size.width,
height: MediaQuery.of(context).size.height,
child: Column(
  mainAxisAlignment: MainAxisAlignment.spaceAround,
  crossAxisAlignment: CrossAxisAlignment.center,
  children:[
    Container(
      color: Colors.blue,
      width: 300,
      height: 100
    ),
    Container(
      color: Colors.orange,
      width: 300,
      height: 100
    ),
    Row(
      mainAxisAlignment: MainAxisAlignment.spaceEvenly,
      crossAxisAlignment: CrossAxisAlignment.center,
      children: [
        Container(
          color: Colors.black,
          width: 120,
          height: 100
        ),
        Container(
          color: Colors.brown,
          width: 120,
          height: 100
        ),
      ],
    )
  ]
)
),
),

```

```
    );  
  }  
}
```

## **Navigation**

Navigation between screens is done using the routes written in main.dart, The route names are used to switch between screens.

In Android, a route is equivalent to an Activity. In iOS, a route is equivalent to a ViewController. In Flutter, a route is just a widget.

This recipe uses the `Navigator` to navigate to a new route.

The next few sections show how to navigate between two routes, using these steps:

1. Create two routes.
2. Navigate to the second route using `Navigator.push()`.
3. Return to the first route using `Navigator.pop()`.

### **1. Create two routes**

First, create two routes to work with. Since this is a basic example, each route contains only a single button. Tapping the button on the first route navigates to the second route. Tapping the button on the second route returns to the first route.

First, set up the visual structure:

```
class FirstRoute extends StatelessWidget {  
  const FirstRoute({super.key});  
  
  @override  
  Widget build(BuildContext context) {  
    return Scaffold(  
      appBar: AppBar(  
        title: const Text('First Route'),  
      ),  
    ),  
  },  
);
```



```

        body: Center(
          child: ElevatedButton(
            child: const Text('Open route'),
            onPressed: () {
              // Navigate to second route when tapped.
            },
          ),
        ),
      );
    }
  }

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

  @override
  Widget build(BuildContext context) {
    return Scaffold(
      appBar: AppBar(
        title: const Text('Second Route'),
      ),
      body: Center(
        child: ElevatedButton(
          onPressed: () {
            // Navigate back to first route when tapped.
          },
          child: const Text('Go back!'),
        ),
      ),
    );
  }
}

```

## 2. Navigate to the second route using Navigator.push()

To switch to a new route, use the `Navigator.push()` method. The `push()` method adds a `Route` to the stack of routes managed by the `Navigator`. Where does the `Route` come from? You can create your own, or use a `MaterialPageRoute`, which is useful because it transitions to the new route using a platform-specific animation.

In the `build()` method of the `FirstRoute` widget, update the `onPressed()` callback:

```
// Within the `FirstRoute` widget
onPressed: () {
  Navigator.push(
    context,
    MaterialPageRoute(builder: (context) => const SecondRoute())
  );
}
```

### 3. Return to the first route using `Navigator.pop()`

How do you close the second route and return to the first? By using the `Navigator.pop()` method. The `pop()` method removes the current `Route` from the stack of routes managed by the `Navigator`.

To implement a return to the original route, update the `onPressed()` callback in the `SecondRoute` widget:

```
// Within the SecondRoute widget
onPressed: () {
  Navigator.pop(context);
}
```

## **Creating the Login Page**

We are going to see how to design a login page with 11 children widgets in a column layout and also validate the input of email and password. We need the following components on the page: user profile image, heading text, paragraph text, email

address text input, password text input, forgot password button, login button, “create an account” link and “book a demo” page.

We first take a Scaffold widget, and in the body we have a container containing a column and use it's children property to load the 11 children components.

## Loading the profile image

1. select an image for the profile and load it
2. open the project file in vs code
3. create a new folder called **assets**
4. drag and drop the image into the **assets** folder
5. open the *pubspec.yaml* file
6. uncomment the assets section in the file
7. write the path of your image in the assets section
8. In the code, Image can be loaded with **Image.asset("assets/logo.png")** or **Image.network("path")** for loading dynamic images from the server.

## Login Page code

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

// ignore: must_be_immutable
class LoginScreen extends StatelessWidget {
  LoginScreen({super.key});

  bool isVisibleOff = false;

  @override
  Widget build(BuildContext context) {
    return Scaffold(
      body: Container(
```

```

        width: MediaQuery.of(context).size.width,
        height: MediaQuery.of(context).size.height,
        margin: EdgeInsets.all(10),
child: Column(
  children: [
    // Profile Image
    Column(
      mainAxisAlignment: MainAxisAlignment.start,
      crossAxisAlignment: CrossAxisAlignment.start,
      children: [
        Image.asset("assets/logo.png", height: 100, width:
const SizedBox(height: 12, ),

        // Welcome Back text
const Text("Welcome Back", style: TextStyle(
  fontSize: 32,
  fontWeight: FontWeight.w600
), ),
const SizedBox(height: 12, ),

        // Paragraph text
const Text("Welcome Back. Enter
style: TextStyle(
  fontSize: 14,
  fontWeight: FontWeight.w
  color: Color.fromRGBO(1
)),
const SizedBox( height: 24 ),

        // Email Input
const Text("Email Address", style:
  fontSize: 14,
  fontWeight: FontWeight.w
  color: Colors.black
)),
const SizedBox( height: 8 ),

```

```

        TextFormField(
          decoration: InputDecoration(
            hintText: "hello@gmail.com",
            border: OutlineInputBorder(
              borderRadius: BorderRadius.circular(10),
            ),
          )),
      const SizedBox( height: 20 ),

      // Password Input
      const Text("Password", style: TextStyle(
        fontSize: 14,
        fontWeight: FontWeight.normal,
        color: Colors.black
      )),
      const SizedBox( height: 8 ),

      TextFormField(
        obscureText: isVisible,
        decoration: InputDecoration(
          hintText: "password",
          suffixIcon: InkWell(
            onTap: (){
              if (isVisible){ isVisible=false; }
              else{ isVisible = true; }
            },
            child: isVisible ?
              const Icon(Icons.visibility_off) :
              const Icon(Icons.visibility),
          ),
          border: OutlineInputBorder(
            borderRadius: BorderRadius.circular(10),
          )),
      const SizedBox( height: 20 ),
    ],
  ),

```

```

Row(
  mainAxisAlignment: MainAxisAlignment.end,
  children: [
    TextButton(onPressed: (){}, child: Text("Forgot Pa
  ],
),
const SizedBox(height: 39),

TextButton(
  onPressed: (){},
  child: Container(
    decoration: BoxDecoration(
      color: const Color.fromRGBO(89, 86, 233, 1),
      borderRadius: BorderRadius.circular(100)
    ),
    width: 280,
    height: 50,
    alignment: Alignment.center,
    child: const Text("Login", style: TextStyle(
      fontSize: 16,
      fontWeight: FontWeight.w600,
      color: Colors.white
    )),
  ),
),
const SizedBox( height: 24),

// Create an account
Row(
  mainAxisAlignment: MainAxisAlignment.center,
  children: [
    const Text("New Here? "),
    TextButton(onPressed: () {},
      child: Text("Create an account"
    )
  ]
)

```

```
    ]  
    )  
    )  
    );  
}  
}
```