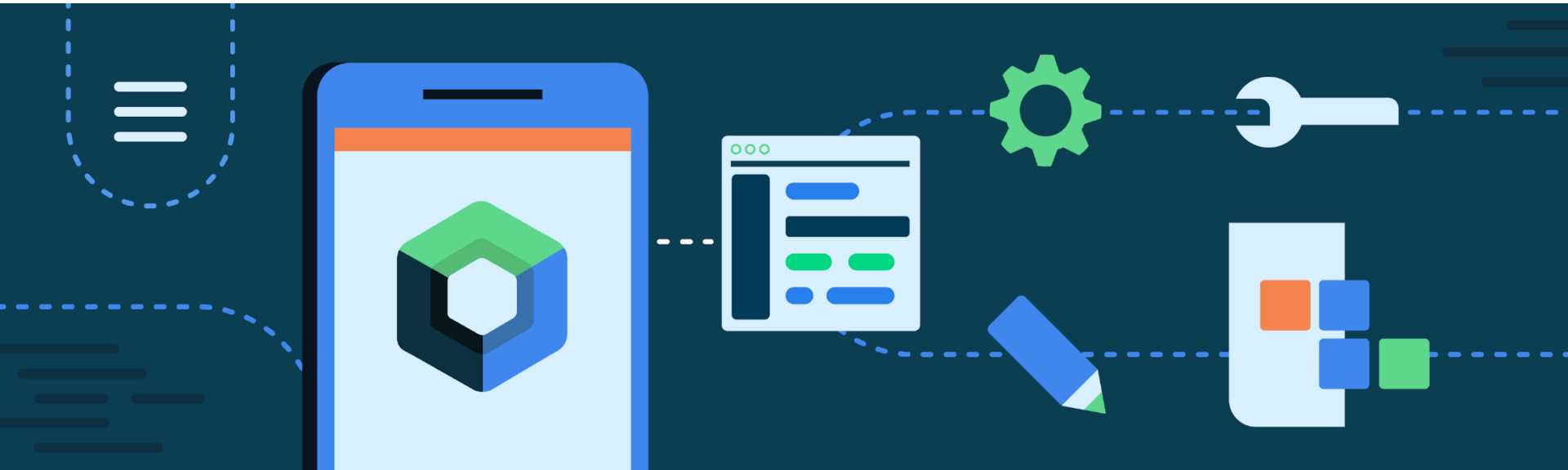


# CMPS 312



## UI Components and Layouts

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**CSE@QU**

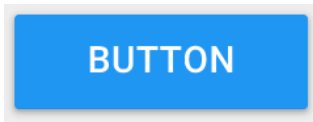
# Outline

1. UI Components
2. Layouts

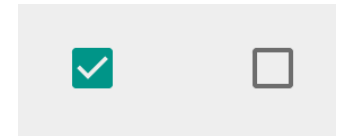
**Examples** are available @  
[cmpts312-content/examples/05.ui-components-layouts](#)

# UI Components

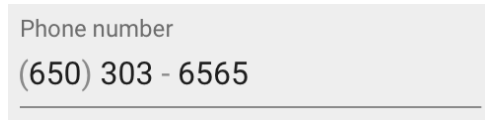
Button



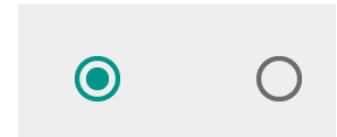
CheckBox



TextField



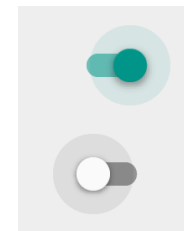
RadioButton



Slider

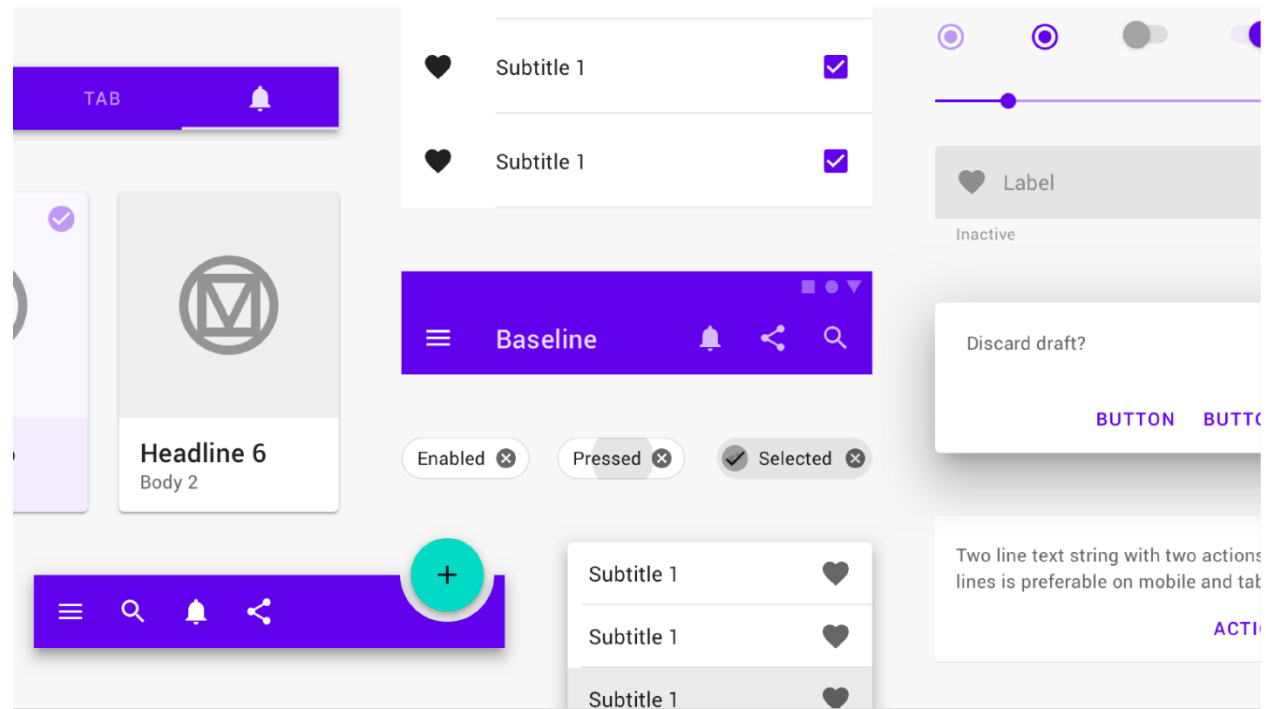


Switch



# UI Components

- Built-in Jetpack Compose UI Components follow Google Material design system  
<https://material.io/>
  - Provides a **consistent experience** across all platforms and applications (Android, Web, Flutter, iOS)



# Text

- **Text()** displays a text

```
Text(  
    text = "Jetpack Compose",  
    style = MaterialTheme.typography.h5  
)
```

Jetpack Compose

```
Text(  
    text = "سور القرآن الكريم",  
    textAlign = TextAlign.Center,  
    modifier = Modifier.fillMaxWidth(),  
    style = TextStyle(  
        fontWeight = FontWeight.Bold,  
        fontSize = 24.sp,  
        color = Color.Blue,  
        textDirection = TextDirection.Rtl  
    )  
)
```

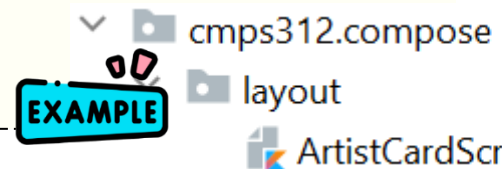
سور القرآن الكريم

# Styled Text

- To set different styles within the same Text composable, use an AnnotatedString, a string annotated with styles using *buildAnnotatedString()*

**471** Artworks

```
Text(  
    text = buildAnnotatedString {  
        withStyle(  
            style = SpanStyle(fontWeight = FontWeight.ExtraBold,  
                               color = Color.Blue)  
        ) {  
            append("${artist.artWorksCount}")  
        }  
        withStyle(style = SpanStyle(fontWeight = FontWeight.Normal)) {  
            append(" Artworks")  
        }  
    }  
)
```



# TextField

- **TextField()** collects input from the user. For more styling options, use **OutlinedTextField()**



```
@Composable
fun NameEditor(name: String, onNameChange: (String) -> Unit) {
    OutlinedTextField(
        value = name,
        onValueChange = onNameChange,
        label = { Text("Your name") }
    )
}
```

# Keyboard options

- TextField lets you set keyboard configurations options, such as the keyboard layout, or enable the autocorrect, capitalization, autoComplete, keyboardType
- Also, it lets you to set a visual formatting of the input value, like replacing characters with \* for passwords

@Composable

```
fun PasswordTextField() {  
    var password by remember { mutableStateOf("") }  

```

```
    OutlinedTextField(  
        value = password,  
        onChange = { password = it },  
        label = { Text("Password") },  
        visualTransformation = PasswordVisualTransformation(),  
        keyboardOptions = KeyboardOptions(keyboardType = KeyboardType.Password)  
    )  
}
```

EXAMPLE

✓ cmps312.compose  
 ✓ components  
 TextFieldScreen.kt



# Image

- Displays an image from the res/drawable folder

```
Image(painter =  
    painterResource(R.drawable.img_compose_logo),  
    contentDescription = "Jetpack compose logo",  
    modifier = Modifier.height(300.dp))
```



# Button



cmps312.compose

components

ButtonScreen.kt

```
Button(onClick = {}) {  
    Text("Button")  
}
```

```
OutlinedButton(onClick = {}) {  
    Text("OutlinedButton")  
}
```

```
TextButton(onClick = {}) {  
    Text("TextButton")  
}
```

*// Search icons @ <https://fonts.google.com/icons>*

```
IconButton(onClick = {}) {  
    Icon(  
        Icons.Outlined.Search,  
        contentDescription = "Search",  
    )  
}
```

```
IconButton(onClick = {}) {  
    Icon(painterResource(id = R.drawable.ic_quran), "Quran")  
}
```

Button

OutlinedButton

TextButton



# Radio Button

- A Radio Button is used to select a **single** option from a list of options

```
radioOptions.forEach { option ->
    Row(
        Modifier
            .fillMaxWidth()
            .selectable(
                selected = (option == selectedOption),
                onClick = { onOptionSelected(option) }
            )
            .padding(horizontal = 16.dp, vertical = 4.dp)
    ) {
        RadioButton(
            selected = (option == selectedOption),
            onClick = { onOptionSelected(option) }
        )

        Text(
            text = option,
            modifier = Modifier.padding(start = 8.dp)
        )
    }
}
```

Which is your most favorite language?

- ☐ Java
- ☒ Kotlin
- ☐ JavaScript



```
▼ cmps312.compose
  ▼ components
    RadioButtonScreen.kt
```

# Switch

- A Switch toggle the state of a single item on or off

Turn on dark theme



```
Row {  
    Text(  
        text = "Turn on dark theme",  
        modifier = Modifier.padding(end = 8.dp)  
    )  
    Switch(  
        checked = isDarkMode,  
        onCheckedChange = { isDarkMode = it }  
    )  
}
```

EXAMPLE

cmpps312.compose  
components  
SwitchScreen.kt

# Checkbox

- Checkbox is used to represent two states i.e., either *checked* or *unchecked*
- When grouped multiple values can be selected

Which are your most favorite language?

- ☒ Kotlin  
☐ Java  
☒ JavaScript

Kotlin (true)  
Java (false)  
JavaScript (true)

```
options.forEach { (option, isChecked) ->
    Row(
        Modifier
            .fillMaxWidth()
            .selectable(
                selected = isChecked,
                onClick = { onCheckedChange(option, !isChecked) }
            )
    ) {
        Checkbox(
            checked = isChecked,
            onCheckedChange = { onCheckedChange(option, it) }
        )
        Text(
            text = option,
            modifier = Modifier.padding(start = 8.dp)
        )
    }
}
```

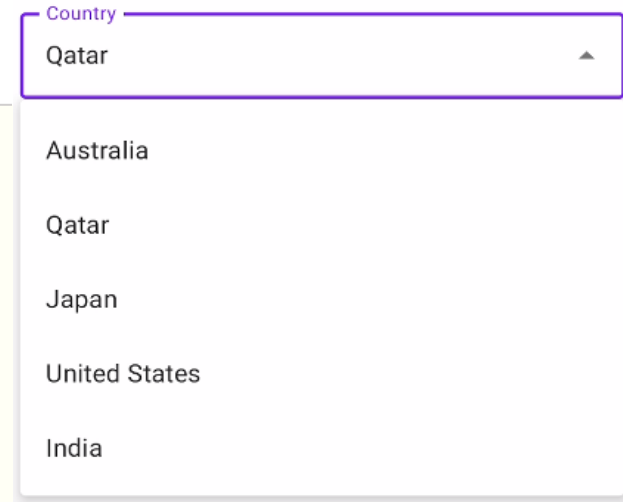
EXAMPLE

cmpps312.compose  
components  
CheckBoxScreen.kt

# Dropdown

- A Dropdown is used to select a single option from a list of options

```
DropdownMenu(  
    expanded = expanded,  
    onDismissRequest = { expanded = false },  
) {  
    options.forEach { option ->  
        DropdownMenuItem(onClick = {  
            expanded = false  
            onSelectionChange(option)  
        }) {  
            Text(text = option)  
        }  
    }  
}
```

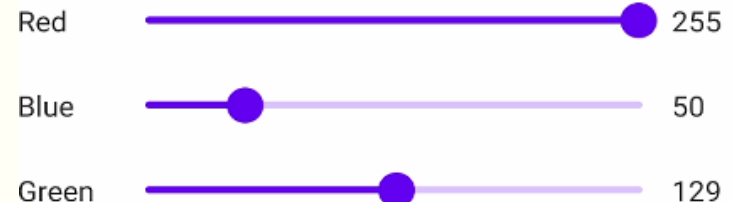


```
└─ cmpps312.compose  
   └─ components  
       └─ DropdownScreen.kt
```

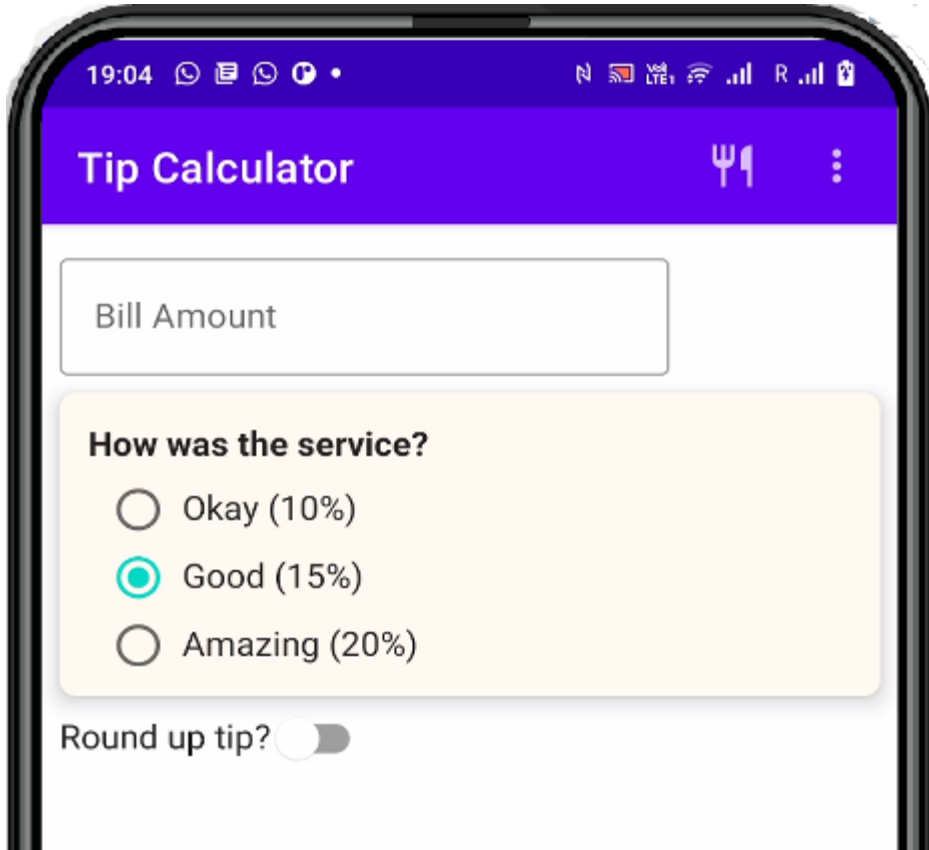
# Slider

- Slider allows the user to select a value from a range along a bar. It is deal for adjusting settings such as volume and brightness.

```
fun ColorSlider(colorName: String, colorValue: Int, onValueChange: (Int) -> Unit) {  
    Row {  
        Text(text = colorName, modifier = Modifier.weight(1.5F))  
        Slider(  
            value = colorValue/100f,  
            onValueChange = { onValueChange((it * 100).roundToInt()) },  
            valueRange = 0.0f..2.55f,  
            modifier = Modifier.weight(8F)  
        )  
        Text(  
            text = "$colorValue",  
            modifier = Modifier.weight(1F)  
        )  
    }  
}
```



# Tip Calculator Example



cmpps312.compose  
TipCalculator.kt



# Layouts



<https://developer.android.com/jetpack/compose/layouts/basics>

# Responsive UI



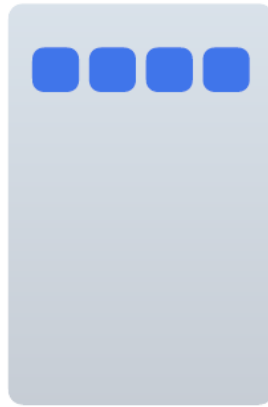
- Layout automatically **controls** the **size** and **placement** (**position** and **alignment**) of UI elements to create a **Responsive UI**
  - Layouts provide an efficient way to **distribute space** among items while accommodating different screen sizes
  - Frees programmer from handling/hardcoding the sizing and positioning of UI elements
  - **Responsive UI** = When the screen is resized, the views reorganize themselves based on the rules of the layout

# Layouts

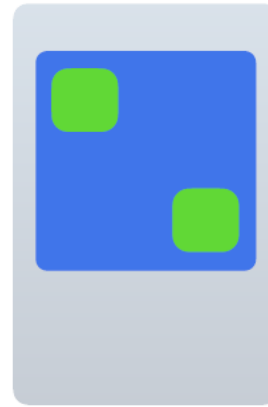
- Use a Layout to **position** UI elements on the screen
  - Control of space distribution and alignment of items in a container
- **Row** - position elements horizontally
- **Column** - position elements vertically
- **Box** - position elements in the corners of the screen or stack them on top of each other
- Use [Constraint Layout](#) (self-study) for complex layouts



Column



Row



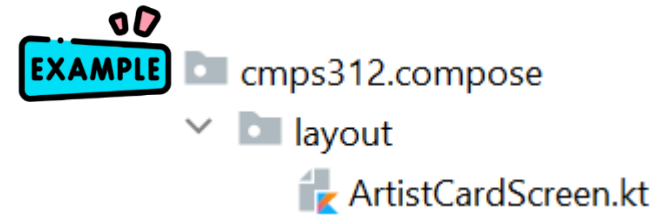
Box



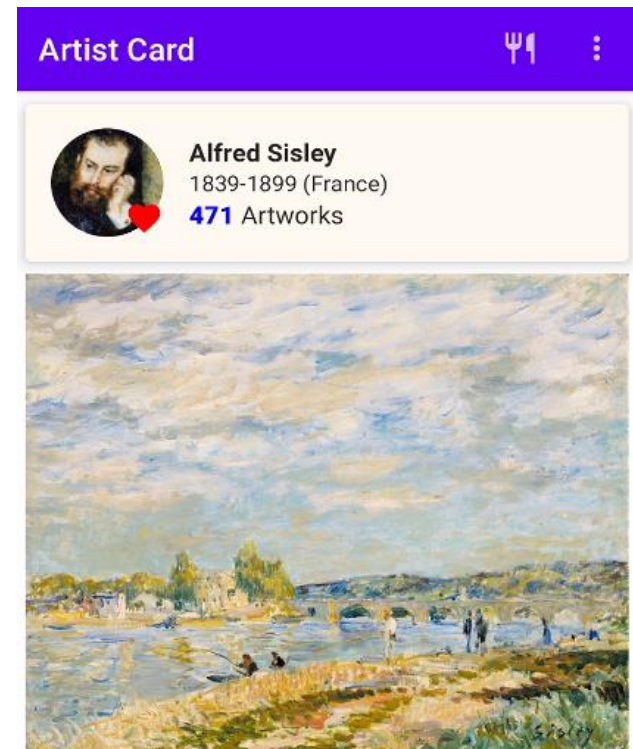
Constraint  
Layout

# Composing Multiple Layouts


- Compose multiple basic layouts to create a more complex screen
  - Use vertical or horizontal **alignment** to change the position of elements
  - Use **modifiers** to style UI elements



```
@Composable
fun ArtistCard(artist: Artist) {
    Column {
        Card {
            Row {
                Box {
                    Image(...)
                    Icon (...)
                }
                Column {
                    Text("${artist.lastName}")
                    Text("${artist.country}")
                }
            }
        }
        Image (...)
    }
}
```



# Box Layout

- The children of the Box layout are **stacked** over each other
  - You can use the **align** modifier to specify the position of child element
  - E.g., the *Favorite*  icon is overlayed over the image and aligned to the bottom right (Alignment.*BottomEnd*)



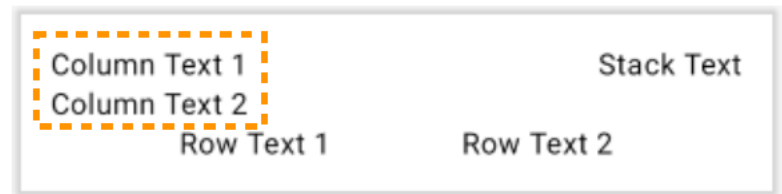
```
Box {  
    Image(  
        painter = painterResource(id = R.drawable.img_alfred_sisley),  
        contentDescription = "${artist.firstName} ${artist.lastName}",  
    )  
    Icon(  
        imageVector = Icons.Filled.Favorite,  
        contentDescription = "Favorite",  
        modifier = Modifier.align(Alignment.BottomEnd),  
    )  
}
```

# Box Example (1 of 3)

```
Box(modifier = Modifier.fillMaxWidth()) {  
    Column(  
        modifier = Modifier  
            .padding(16.dp)  
            .fillMaxWidth()  
    ) {  
        Text("Column Text 1")  
        Text("Column Text 2")  
  
        Row(  
            modifier = Modifier.fillMaxWidth(),  
            horizontalArrangement = Arrangement.SpaceEvenly  
        ) {  
            Text(text = "Row Text 1")  
            Text(text = "Row Text 2")  
        }  
    }  
    Text(  
        "Stack Text",  
        modifier = Modifier  
            .align(Alignment.TopEnd)  
            .padding(end = 16.dp, top = 16.dp)  
    )  
}
```

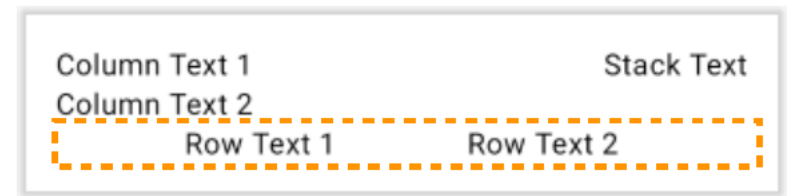


cmps312.compose  
layout  
BoxLayoutScreen.kt



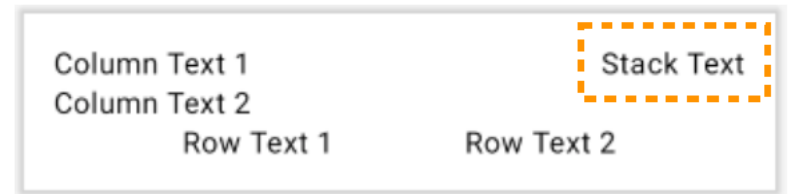
# Box Example (2 of 3)

```
Box(modifier = Modifier.fillMaxWidth()) {  
    Column(  
        modifier = Modifier  
            .padding(16.dp)  
            .fillMaxWidth()  
    ) {  
        Text("Column Text 1")  
        Text("Column Text 2")  
  
        Row(  
            modifier = Modifier.fillMaxWidth(),  
            horizontalArrangement = Arrangement.SpaceEvenly  
        ) {  
            Text(text = "Row Text 1")  
            Text(text = "Row Text 2")  
        }  
    }  
    Text(  
        "Stack Text",  
        modifier = Modifier  
            .align(Alignment.TopEnd)  
            .padding(end = 16.dp, top = 16.dp)  
    )  
}
```



# Box Example (3 of 3)

```
Box(modifier = Modifier.fillMaxWidth()) {  
    Column(  
        modifier = Modifier  
            .padding(16.dp)  
            .fillMaxWidth()  
    ) {  
        Text("Column Text 1")  
        Text("Column Text 2")  
  
        Row(  
            modifier = Modifier.fillMaxWidth(),  
            horizontalArrangement = Arrangement.SpaceEvenly  
        ) {  
            Text(text = "Row Text 1")  
            Text(text = "Row Text 2")  
        }  
    }  
    Text(  
        "Stack Text",  
        modifier = Modifier  
            .align(Alignment.TopEnd)  
            .padding(end = 16.dp, top = 16.dp)  
    )  
}
```





# Surface & Card

- A **Surface** can hold only one child with an option to add a **border** and **elevation**
  - Add a layout inside Surface to position multiple elements
- A **Card** is a just a Surface with default parameters

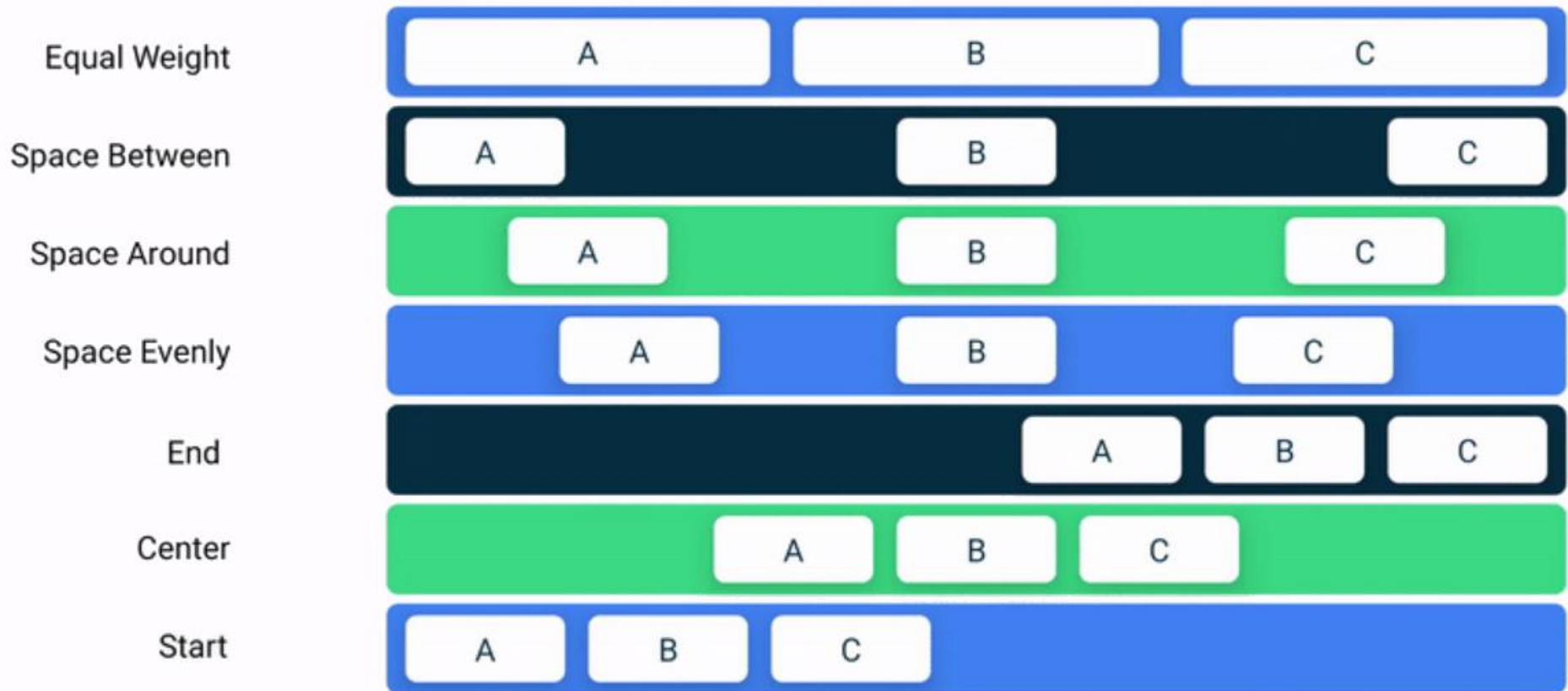
# Responsive Layout

- Use the **weight** modifier in Row and Column layouts to change the **proportion** of the screen child elements will use
  - Distribute space among items in a container while accommodating different screen sizes
- Modifier.*fillMaxWidth*() fill available width
- Modifier.*fillMaxHeight*() fill available height
- Modifier.*fillMaxSize*() fill available width and height
- For more control use [Constraint Layout](#) (self-study) for complex scenarios

# Responsive Layout using Arrangement & Alignment

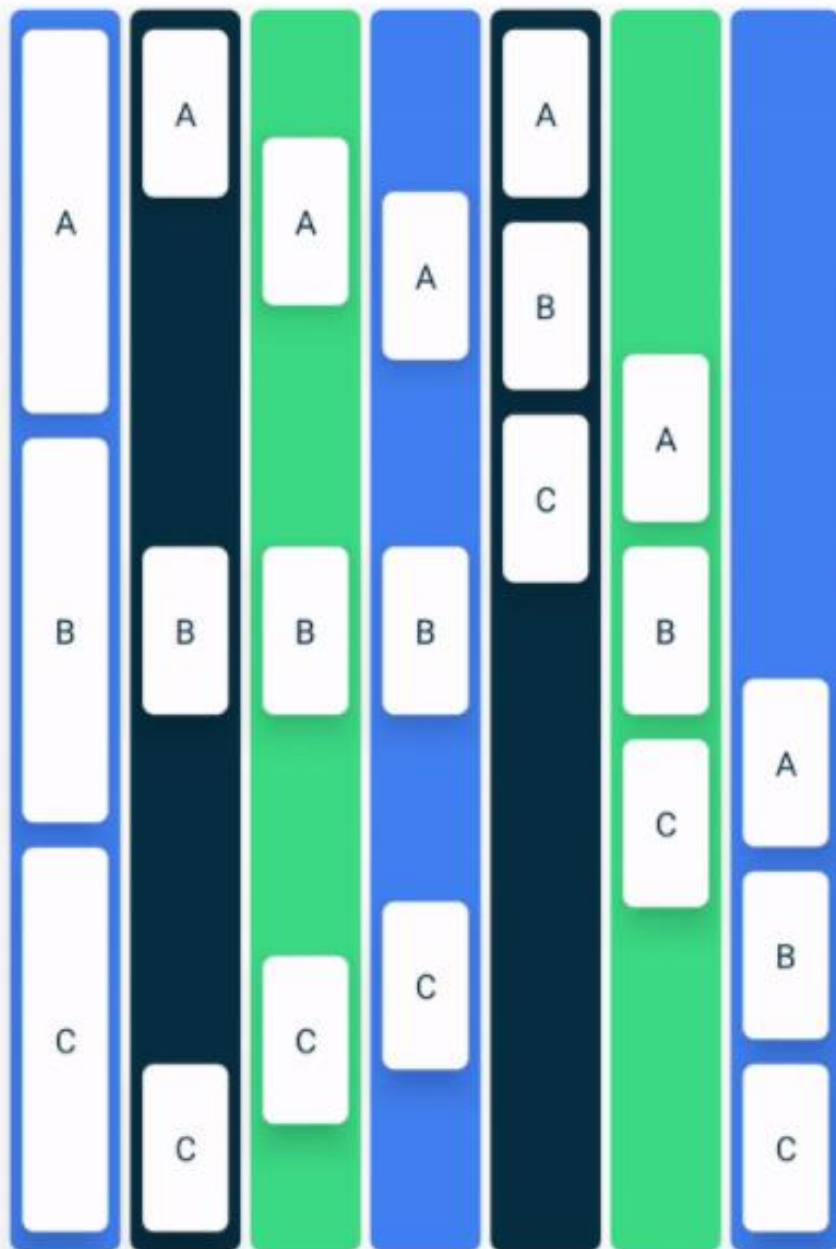
- Layout parameters can be used to configure the alignment of the elements within it
- To set children's position within a Row, set the **horizontalArrangement** and **verticalAlignment** arguments
- For a Column, set the **verticalArrangement** and **horizontalAlignment** arguments

# Horizontal Arrangement



- Distribute extra leftover free space along the horizontal axis
- You also you can use **spacedBy**(space: Dp) to specify the space between child elements
- More details available at thin [link](#)

Equal Weight   Space Between   Space Around   Space Evenly   Top   Center   Bottom



# Vertical Arrangement

- Distribute extra leftover free space along the vertical axis

# Summary

- Use **TextField** - for collecting input from the user
- Use **RadioButtons** - for single item selection from a small set of options
- Use **Dropdown** - for single item selection from a larger set of options
- Use **Checkboxes** - for multi-item selection
- Use **Slider** - for picking a value from a range
- Use a Layout to position UI elements on the screen
  - **Row** - position elements horizontally
  - **Column** - position elements vertically
  - Use vertical or horizontal **alignment** to change the position of elements
  - Use **modifiers** to style UI elements

# Resources

- Jetpack compose tutorial

<https://developer.android.com/jetpack/compose/tutorial>

- Jetpack compose Code Labs

<https://developer.android.com/courses/pathways/compose>

- Jetpack Compose Playground - UI component examples

<https://foso.github.io/Jetpack-Compose-Playground/>

<https://github.com/Foso/Jetpack-Compose-Playground>

<https://github.com/Gurupreet/ComposeCookBook>

- Compose Samples

<https://github.com/android/compose-samples>