Input Variables Operations

```
Course Code: ELEE1146

Course Name: Mobile Applications for Engineers

Credits: 15

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```

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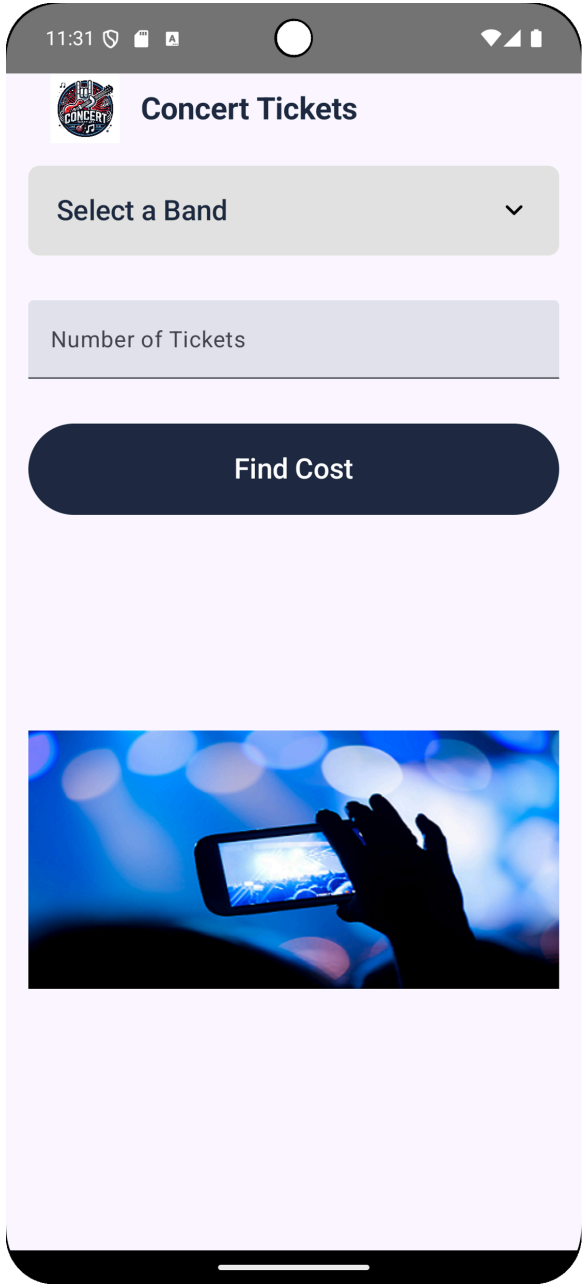
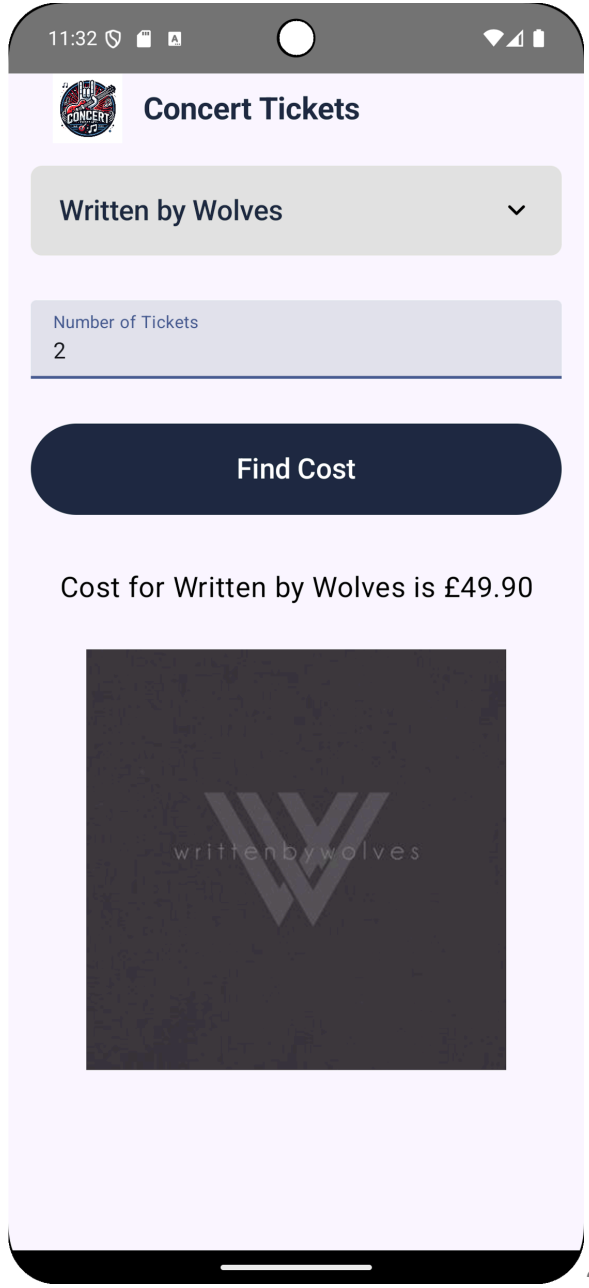
The result of the lab





Android Themes

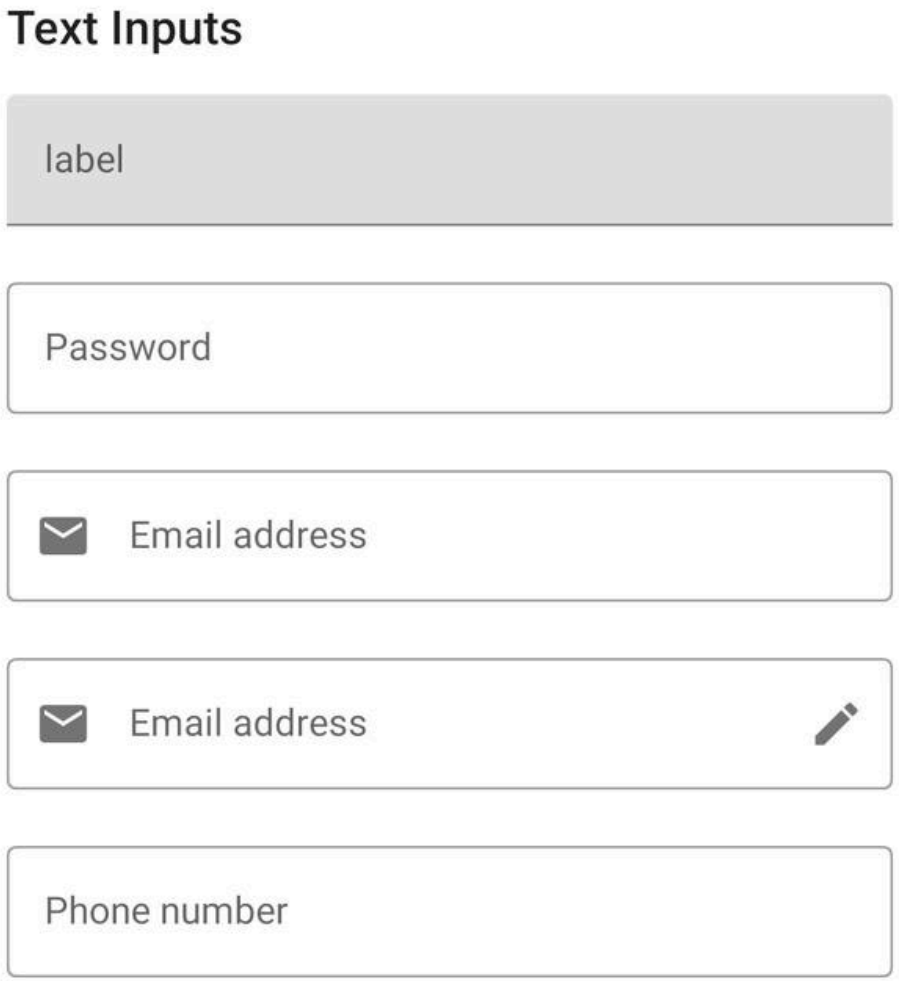
- A **theme** is a style applied to an Activity or an entire application
  - Themes are Android's mechanism for applying a consistent style to an app or Activity
  - The style specifies the visual properties of the elements that make up a user interface, such as colour, height, padding, and font size
  - Some themes change the background wallpaper of the Activity, while others hide the title bar or display an action bar
  - Some themes display a background depending on the size of the mobile device
  - You can preview themes in the emulator in `activity_main.xml`
  - By changing the theme in the emulator in `activity_main.xml` file, you can preview what the theme looks like, but to change it permanently in the application, you must define the themes in the `themes.xml` file within the values subfolder of the Activity

Simplifying User Input

- Users can enter text in multiple ways on Android phone:
  - Through an onscreen soft keyboard
  - An attached flip button hard keyboard
  - Voice-to-text capabilities on most phone models
- The onscreen keyboard is called a soft keyboard
  - Input can be in the form of tapping or gestures (using two fingers to pan, rotate, or zoom)
  - Primary design challenge is to simplify user experiences
  - Use legible fonts, simplify input, and optimize each device’s capabilities to maximize user experience

Simplifying User Input

- `TextFields` are the most common type of mobile
  - input
  - Can be free-form plain text
  - Numbers (whole/decimals)
  - A person’s name,
  - password, email,
  - phone number
  - A date and time
  - Multiline text

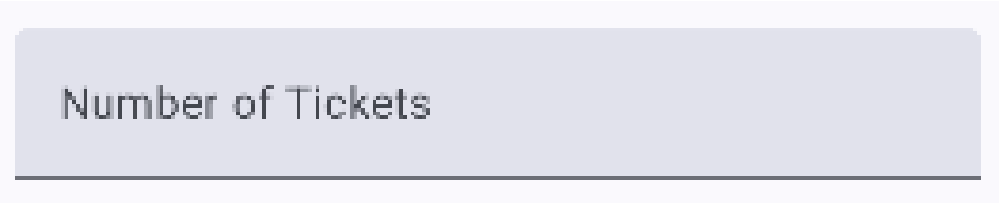


Simplifying User Input

- The Concert Tickets app requests the number of concert tickets, which is a positive integer number.
- There is a variety of `TextFields` to choose from in Jetpack Compose.
- By selecting the `TextField` with specific `keyboardOptions`, developers can customize the keyboard for different input types. For instance, by using the `Number` keyboard type, users can only enter numbers, preventing the app from accepting letters or symbols.
- This way, the app will not accept invalid input, saving developers time from having to write extra validation code.

Example `TextField`

```
TextField(
      value = ticketCount,
      onValueChange = onTicketCountChange,
      label = { Text("Number of Tickets") },
      keyboardOptions = KeyboardOptions(keyboardType = KeyboardType.Number),
      modifier = Modifier.fillMaxWidth()
)
```



API here: user-inputs

Adding a String Array

- In order to define a drop-down list in Android Studio, you will need to define a string-array in `strings.xml`
- A string array defines a string resource of related items in a central location within `strings.xml`
- An item defines an individual entry within a string array
    - As you type the string-array XML code, the Android Studio editor offers suggestions in a panel that can complete the statement

String-Array

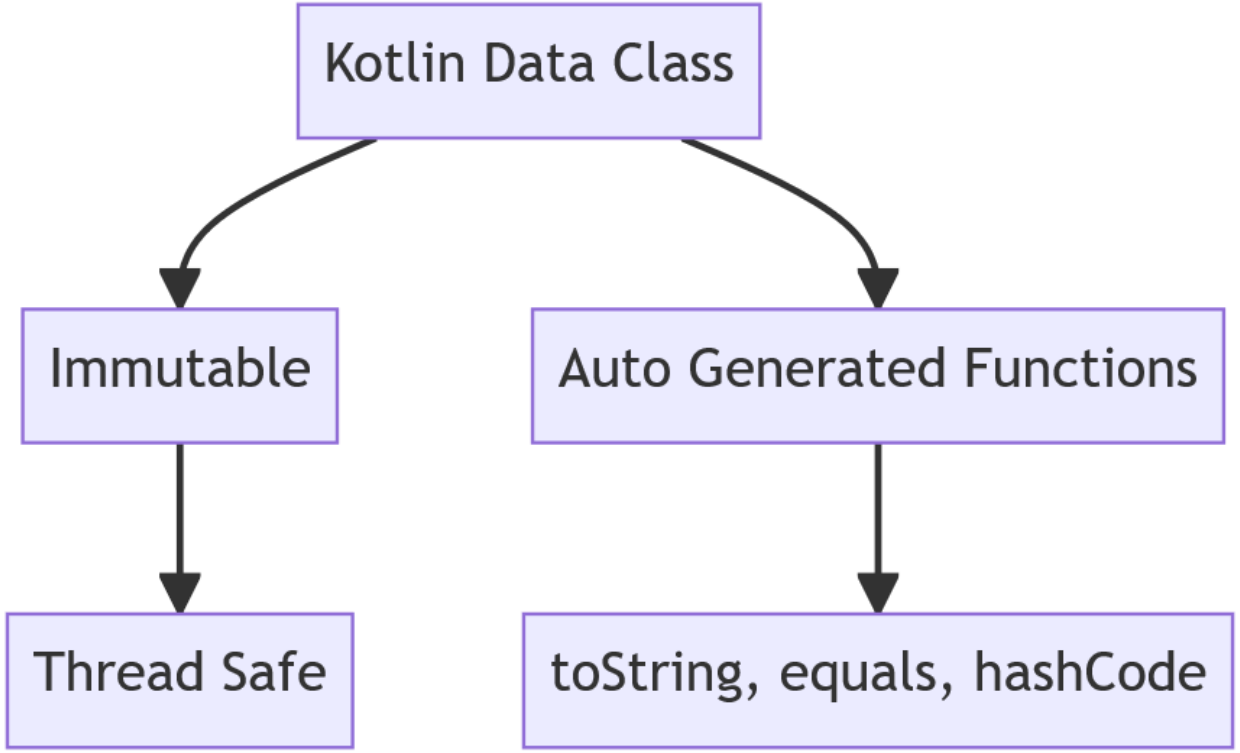
```
<resources>
    <string name="app_name">Concert Tickets</string>

    <string name="txtTickets">Number of Tickets</string>
    <string name="prompt">Select Group</string>
    <string name="description">Concert Image</string>
    <string name="btnCost">FIND THE COST</string>

    <string-array name="txtGroup">
        <item>Linkin Park</item>
        <item>Hollywood Undead</item>
        <item>Man with a Mission</item>
        <item>Written by Wolves</item>
    </string-array>
</resources>
```

Data Class

```
data class Band(
  val name: String,
  val imageRes: Int,
  val price: Float)
```



`Object` of `data` class

```
data class Band(
  val name: String,
  val imageRes: Int,
  val price: Float)
```

```
object BandDataSource {
    val bands = listOf(
        Band("Select a Band", R.mipmap.concert, 0.0f),
        Band("Written by Wolves", R.mipmap.written_by_wolves,24.95f),
        Band("Linkin Park", R.mipmap.linkin_park, 63.95f),
        Band("Man with a Mission", R.mipmap.man_with_a_mission, 36.00f),
        Band("Hollywood Undead", R.mipmap.hollywood_undead,125.0f)
    )
}
```

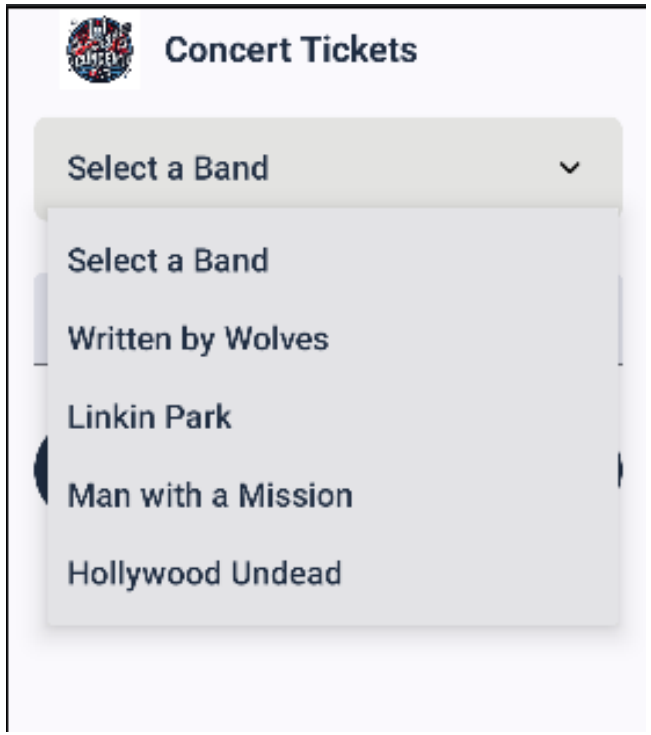
```
var selectedBand by remember { mutableStateOf(BandDataSource.bands[0]) }
```

Using the DropDownMenu

- A `DropDownMenu` is a widget used for selecting a single item from a fixed list of options.
- The `DropDownMenu` displays a list of `DropDownMenuItems` for users to choose from in a dropdown pop-up menu.
- A `label` or `hint` can be provided to display instructions or a title for the `DropDownMenu`, typically defined in your layout or resource files.
- The `DropDownMenuItems` represent the individual options within the menu and are usually connected to a data source, such as a `String` array or `listOf` `objects`, for display in the application.

Coding the `DropDownMenu`

```
DropdownMenu(
        expanded = expanded,
        onDismissRequest = { expanded = false },
        modifier = Modifier
            .background(Color(0XFFE3E3E6))
            .width(350.dp)
    ) {
        BandDataSource.bands.forEach { band ->
            DropdownMenuItem(
                text = {
                    Text(
                        text = band.name,
                        color = Color(0Xff1e2c41),
                        fontSize = 20.sp)
                        },
                onClick = {
                onBandSelected(band)
                expanded = false
            })
        }
    }
```



Variables

- Variables stores values
- Each variable has
  - an identifier (name)
  - a type (data type)
    - variable size
    - range of values
    - the operations that can be performed with this variable type

Primitive Data Types

Type	Size	Signed	Unsigned
`Byte`	2^8	-127 to 128	0 to 255
`Short`	2^{16}	-32,768 to 32,767	0 to 65,535
`Int`	2^{32}	-2,147,483,648 to 2,147,483,647	0 to 4,294,967,295
`Long`	2^{64}	-9,223,372,036,854,775,808 to 9,223,372,036,854,775,807	0 to 18,446,744,073,709,551,615
`Float`	2^{32}	-2,147,483,648 to 2,147,483,647	0 to 4,294,967,295
`Double`	2^{64}	-9,223,372,036,854,775,808 to 9,223,372,036,854,775,807	0 to 18,446,744,073,709,551,615

> 2^{128} IPv6 340 undecillion

Prespective: 2^{128} || 340 Undecillion using Encryption

AES-128 uses a 128-bit key, which means there are 2^{128} (approximately $3.4 \cdot 10^{38}$) possible keys. It would take to try all of them at a trillion combinations per second:

$$Time(inseconds) = \frac{NumberofPossibleKeys}{CombinationsperSecond} = \frac{2^{128}}{1,000,000,000,000}$$

Let's calculate this:

$$\frac{2^{128}}{1,000,000,000,000} \approx 3.4 \cdot 10^{38} \text{ seconds}$$

To convert this to years, you can use the fact that there are 31,536,000 seconds in a year:

$$\frac{3.4 \times 10^{38}}{31,536,000} \approx 1.08 \cdot 10^{30} \text{ years}$$

What about Strings

```
private var groupChoice: String? = null
```

- String Data Type
  - The String type is a class and not a primitive data type
  - A string can be a character, word, or phrase
  - `?` this is a Nullable type, meaning it can be either a `String` or `null`

Elivs operator `?:`

```
val count = ticketCount.toIntOrNull() ?: 0
```

- Data is read in as a `String`, by default, hence `toIntOrNull() ?`
  - Parses the `String` as an `Int` number and returns the result or `null` if the string is not a valid representation of a number.
  - or by adding `?: 0` returns zero if `null`

```
Button(
        onClick = {
            val count = ticketCount.toIntOrNull() ?: 0
            if (selectedBand.name == "Select a Band") {
                onCalculate("Please select a band")
            } else if (count <= 0) {
                onCalculate("Enter value greater than 0")
            } else {
                val total = costPerTicket * count
                onCalculate("Cost for ${selectedBand.name} is ${format.format(total)}")
            }
        },
```

Working with Mathematical Operations

Arithmetic Operator	Use	Assignment Statement
+	Addition	`value = itemPrice + itemTax;`
-	Subrtaction	`score = previousScore - 2;`
*	Multiplication	`totalCost = costPerTicket * numberOfTickets;`
**	Power	`squared = 10**2`
/	Division	`average = totalGrade / 5.0;`
%	Remainder	`leftOver = widgetAmount % 3;`
++	Increment (adds 1)	`score++`
--	Decrement (subtracts 1)	`score--`

`NumberFormat` and `setText()`

- `NumberFormat`

```
fun CalculateCostButton(selectedBand: Band, ticketCount: String, onCalculate: (String) -> Unit) {
  val format: NumberFormat = NumberFormat.getCurrencyInstance().apply {
      currency = Currency.getInstance("GBP"), maximumFractionDigits = 2, minimumFractionDigits = 2
  }
  ...
}
```

- **Setting the `TextField`**

```
CalculateCostButton(selectedBand, ticketCount) { totalCost = it }
...
CostDisplay(totalCost)
...
@Composable
fun CostDisplay(totalCost: String) {
    Text(
        text = totalCost, fontSize = 20.sp, color = Color.Black,
        modifier = Modifier.fillMaxWidth(), textAlign = TextAlign.Center
    )
}
```