MSIB
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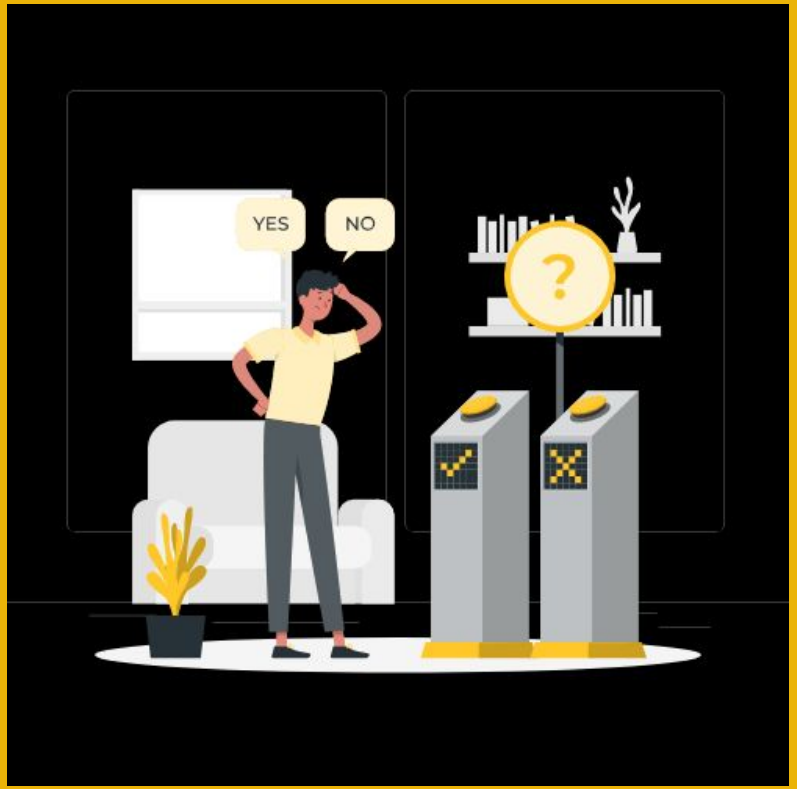
LEARNING



Control Flow

How to control the flow
of a program

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Control Flow

Control flow is a way to control the flow of a program based on conditions when the program is running.

- Expressions & Statements
- When Expressions
- Range
- For Loop & While Loop
- Break & Continue

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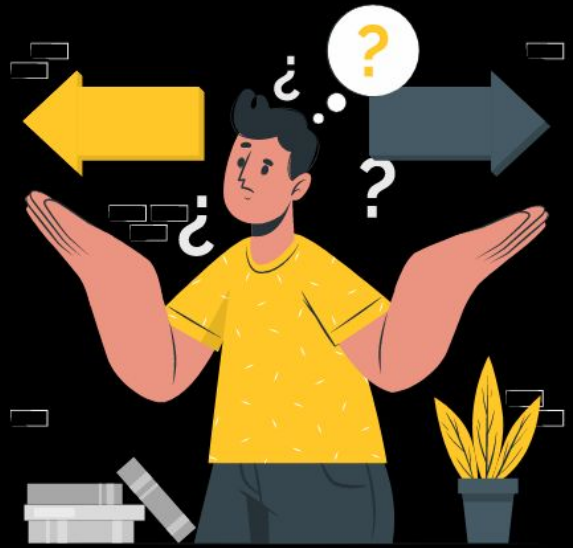
Expressions & Statements



if…else Expression

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- In Kotlin, **if** is an expression that can return a value, so the result can be stored as a variable.
- if can be used to test a condition for running a process.
- So let's start with traditional **if...else** statement.

```
val condition = true

if (condition) {
    println("code block to be executed if condition is true")
} else {
    println("code block to be executed if condition is false")
}
```

if…else Expression

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If in Kotlin can also be used as an expression. Let's try using an if statement that can return a value to a variable.

And now let's try for if...else expression:

```
fun main() {

    val timeClose = 8
    val timeNow = 8

    val isClosed = if(timeNow >= timeClose) "Class already closed" else "Class is open"

    println(isClosed)

}
```

if…else Expression

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We can use else if condition to specify a new condition if the first condition is false.

Let's code!

```
fun main() {

    val timeOpen = 8
    val timeClose = 12
    val timeNow = 7

    val classStatus = if(timeNow >= timeClose) {
        "Class already closed"
    } else if(timeNow >= timeOpen) {
        "Class is open"
    } else {
        "Class is not open yet"
    }

    println(classStatus)

}
```

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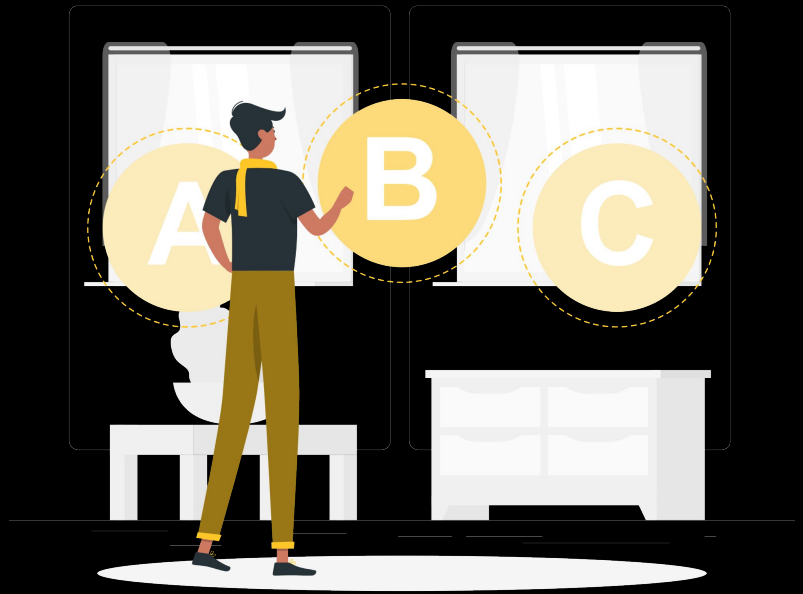
When Expression



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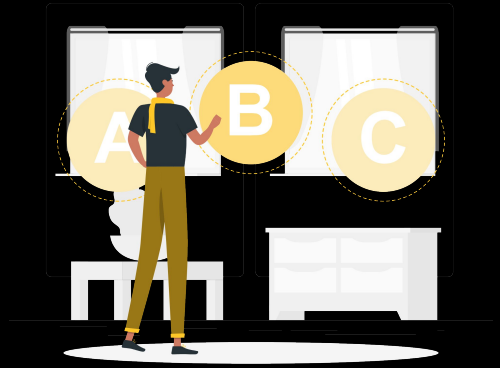
When Expression

Though you can use if..else if expression to handle the situation, Kotlin provides when expression to handle the situation in nicer way.

Far easy and more clean.



When Expression

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- **When** is a mechanism for matches argument against all branches sequentially until some branch condition is satisfied.
- Inside when can also add *else* branch.
- *else* will be evaluated if no one of the conditions are match on the previous branch.
- *else* is mandatory if using a when expression to return a value.

Let's code it!

```
fun main() {

    val day = 1

    val result = when (day) {
      1 -> "Monday"
      2 -> "Tuesday"
      3 -> "Wednesday"
      4 -> "Thursday"
      5 -> "Friday"
      6 -> "Saturday"
      7 -> "Sunday"
      else -> "Invalid day."
    }

    println(result)

}
```

When Expression

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when can combine multiple conditions into a single condition.

Let’s code it!

```
fun main() {

    val day = 2

    when (day) {
      1, 2, 3, 4, 5 -> println("Weekday")
      else -> println("Weekend")
    }

}
```

When Expression

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If running two or more lines of code on each branch, put them in curly braces.

Let's code it!

```
fun main(args: Array<String>) {
   val day = 2

   when (day) {
     1 -> {
        println("First day of the week")
        println("Monday")
     }
     2 -> {
        println("Second day of the week")
        println("Tuesday")
     }
     3 -> {
        println("Third day of the week")
        println("Wednesday")
     }
     4 -> println("Thursday")
     5 -> println("Friday")
     6 -> println("Saturday")
     7 -> println("Sunday")
     else -> println("Invalid day.")
   }
}
```

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Range

Range ..

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Kotlin lets you easily create ranges of values using the **rangeTo()** function from the kotlin.ranges package and its operator form **...** Usually, rangeTo() is complemented by **in** or **!in** functions.

```
val rangeInt = 1..10
```

Similar to the code below, but cannot use existing functions or properties in Range

```
val rangeInt = intArrayOf(1,2,3,4,5,6,7,8,9,10)
```

Range .., .rangeTo()

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Let's code it!

Using ..

```
fun main() {

    val rangeInt = 1..10
    println("Step: " + rangeInt.step)
    print(rangeInt.toList())

}
```

Using .rangeTo()

```
fun main() {

    val rangeInt = 1.rangeTo(10)
    println("Step: " + rangeInt.step)
    print(rangeInt.toList())

}
```

Range step

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- The distance between the two included values is determined by the step.
- By default, step is 1.
- To get the *step*, you can use the step property.

Let's code it!

```
fun main() {

    val rangeInt = 1..10 step 2
    println("Step: " + rangeInt.step)
    print(rangeInt.toList())

}
```

rangeTo() & downTo()

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To check whether a value is present or not in the range of values, you can use **in** or **!in**.

Let's code it!

```
fun main() {
    var i = 4
    if (i in 1.rangeTo(10)) { // equivalent of i >= 1 && i <= 10
        println("Value 4 available in Range")
    }
}
```

```
fun main() {
    var i = 20
    if (i !in 10.downTo(1)) {
        println("Value 4 is not available in Range")
    }
}
```

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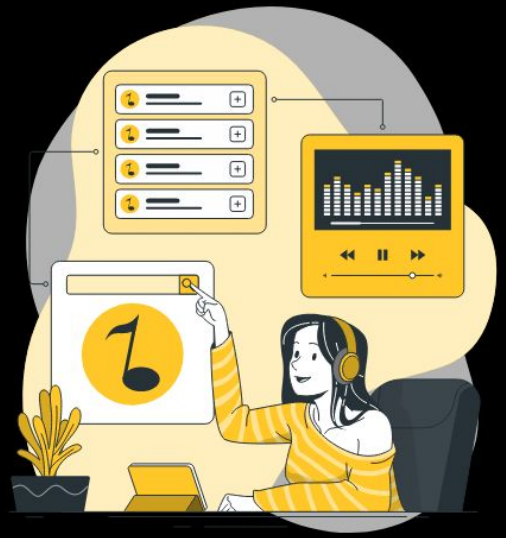
For Loop & While Loop

The ***for*** *loop* iterates through anything that provides an iterator.



This is equivalent to the *foreach* loop in languages like C#.

For Loop

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For loop is the concept of looping on the same block as long as the results of the evaluation conditions are met or are **true**.

For loop can be used on Ranges, Collections, Arrays and anything that provides an iterator

```
for (i in 1..7){
    println("Infinite Learning")
}
```

```
fun main() {
    println("Start")
    println("Infinite Learning")
    println("Infinite Learning")
    println("Infinite Learning")
    println("Infinite Learning")
    println("Infinite Learning")
    println("Infinite Learning")
    println("Infinite Learning")
    println("Finish!")
}
```

For Loop

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The **for loop** can be performed using a **range expression**

```
fun main() {

    for (i in 1..20){
        println("Value is $i")
    }

}
```

Can also use a for loop to iterate through the **array**

```
fun main() {

    val days = arrayOf("Monday","Tuesday","Wednesday",
                       "Thursday", "Friday",
                       "Saturday", "Sunday")
    for (day in days){
        println(day)
    }

}
```

Let's code it!

For Loop - withIndex()

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Access the index for each element in Ranges using the **withIndex()** function

Let's code it!

```
fun main() {

    val days = arrayOf("Monday","Tuesday","Wednesday",
                       "Thursday", "Friday",
                       "Saturday", "Sunday")
    for ((index, value) in days.withIndex()) {
        println("value $value with index $index")
    }

}
```

For Loop - forEach

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In addition to using the *for* keyword, for make the loop process can use the **forEach** extension.

Let's code it!

```
fun main() {

    val days = arrayOf("Monday","Tuesday","Wednesday",
                       "Thursday", "Friday",
                       "Saturday", "Sunday")
    days.forEach { value ->
        println("Day is $value")
    }

}
```

For Loop - forEachIndexed

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In the previous code *forEach* is a lambda expression that has only one argument which is a **single value** enclosed in ranges.

If you want to get the index of each included value you can use the **forEachIndexed** extension.

```
fun main() {

    val days = arrayOf("Monday","Tuesday","Wednesday",
                       "Thursday", "Friday",
                       "Saturday", "Sunday")
    days.forEachIndexed {  index, value ->
        println("Day $value with index: $index")
    }

}
```

Let’s code it!

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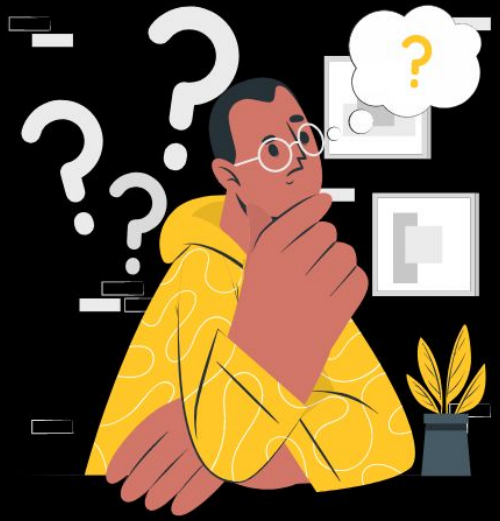
Any question?



While & Do While

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- *While* loop is very flexible
- To make a **loop** with *while*, use the keyword **while**
- While checks the **condition**, if the **condition** evaluates to **true**, it will execute the while **block**

keyword **while**

while **condition**

```
fun main() {
    while (condition) {
        // body of the loop
    }
}
```

while loop **body**

While & Do While

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The code block is **repeated** until the while condition evaluates to **false**

Let's code it!

```
fun main() {
    var i = 0

    while (i < 10) {
        println("Loop to : $i")
        i++
    }
}
```

While & Do While

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The block code will be executed **first**, then the condition **check** will be carried out at the **end**

Let's code it!

```
fun main() {
    var i = 0
    do {
        println("$i Kampus Merdeka")
        i++
    } while (i <=8)
}
```

Run: MainKt

```
1 Kampus Merdeka
2 Kampus Merdeka
3 Kampus Merdeka
4 Kampus Merdeka
5 Kampus Merdeka
6 Kampus Merdeka
7 Kampus Merdeka
8 Kampus Merdeka

Process finished with exit code 0
```

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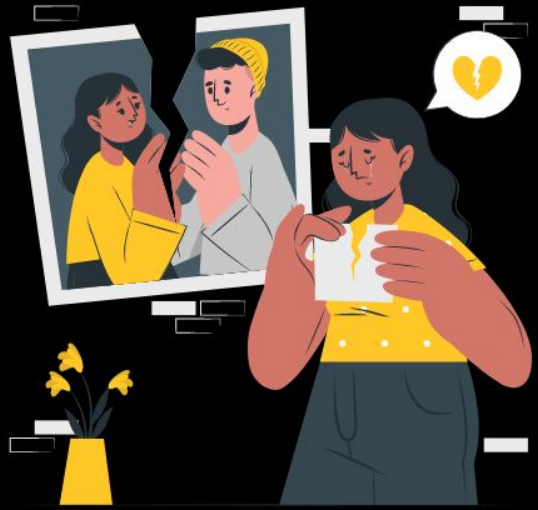
Break & Continue



Break

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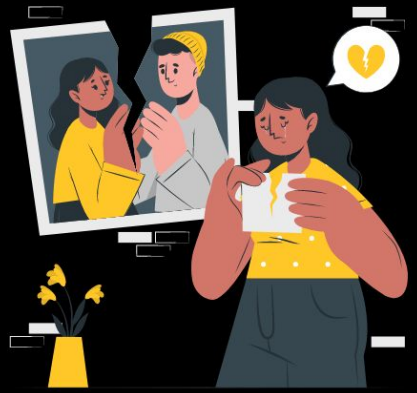
- When doing a loop and want to skip or stop the loop, for example if the resulting value is null? can use **Break** and **Continue**.
- **Break** is used to **stop** the iteration process.
- To **stop** a loop with the keyword **Break.**



Break

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Let's code it!

```
fun main() {
    var i = 0
    while (true) {
        println("Break $i")
        i++
        if (i > 500) {
            break
        }
    }
}
```

```
fun main() {

    val c = 2
    for (b in 1..10) {

      println("Sayang...")

      if(b == c){

        println("Putus!")

        break
      }
    }

}
```

Continue

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- **Continue** is used to **stop** the loop that is running, and **immediately continue** to the next loop
- To skip a loop with the keyword Continue

```kotlin
fun main() {
    val listInt = listOf(1, 2, null, 4, 5, null, 7)

    for (i in listInt) {
        if (i == null) continue
        print(i)
    }
}
```

```kotlin
fun main() {
    println("Print odd numbers")
    for (i in 1 ≤ .. ≤ 20) {
        if (i % 2 == 0) {
            continue
        }
        println("$i is an odd number")
    }
}
```

GUIDING RESOURCE

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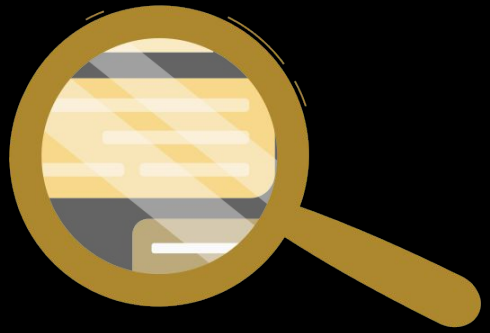
Guiding Resources:

1. https://kotlinlang.org/docs/control-flow.html
2. https://kotlinlang.org/docs/ranges.html#type-checks-and-automatic-casts
3. https://www.tutorialspoint.com/kotlin/kotlin_control_flow.htm



Design Asset:

https://storyset.com

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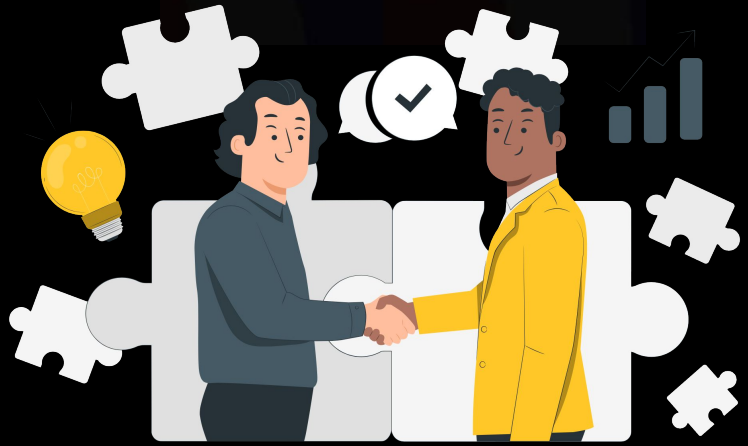

Cheers

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