Swift Recursion

In this tutorial, we will learn about recursive function in Swift and its working with the help of examples.

A function (/swift-programming/functions) that calls itself is known as a recursive function. And, this technique is known as recursion.

A physical world example would be to place two parallel mirrors facing each other. Any object in between them would be reflected recursively.

Working of Recursion in Swift

```
func recurse() {
  ... ...
  recurse()
  ...  ...
}

recurse()
```

Here, the `recurse()` function is calling itself over and over again. The figure below shows how recursion works.

Working of Function Recursion in Swift

Stopping Condition for Recursion

If we don't mention any condition to break the recursive call, the function will keep calling itself infinitely.

We use the if...else statement (/swift-programming/if-else-statement) (or similar approach) to break the recursion.

Normally, a recursive function has two branches:

- One for recursive calls.
- Another for breaking the call under certain conditions.

For example,

```
func recurse() {

  if(condition) {
    // break recursive call
    recurse()
  }

  else {
    // recursive call
    recurse()
  }
}

// function call
recurse()
```

Example 1: Swift Function Recursion

```
  print(number)

  // condition to break recursion
  if number == 0 {
  print("Countdown Stops")
  }

  // condition for recursion call
  else {

    // decrease the number value
    countDown(number: number - 1)
  }
}


print("Countdown:")
countDown(number:3)
```

Output

```
Countdown:
3
2
1
0
Countdown Stops
```

In the above example, we have created a recursive function named `countDown()`. Here, the function calls itself until the number passed to it becomes **0**.

When the `number` is equal to **0**, the `if` condition breaks the recursive call.

```
if number == 0 {
print(Countdown Stops)
}
```

Working of the program

Iteration	Function call	Print	number == 0 ?
1	`countDown(3)`	**3**	`false`
2	`countDown(2)`	**2**	`false`
3	`countDown(1)`	**1**	`false`
4	`countDown(0)`	**0**	`true` (function call stops)

Example: Find factorial of a number

```
  }

  // condition for recursive call
  else {
    return num * factorial(num: num - 1)
  }

}

var number = 3

// function call
var result = factorial(num: number)
print("The factorial of 3 is", result)
```

Output

```
The factorial of 3 is 6
```

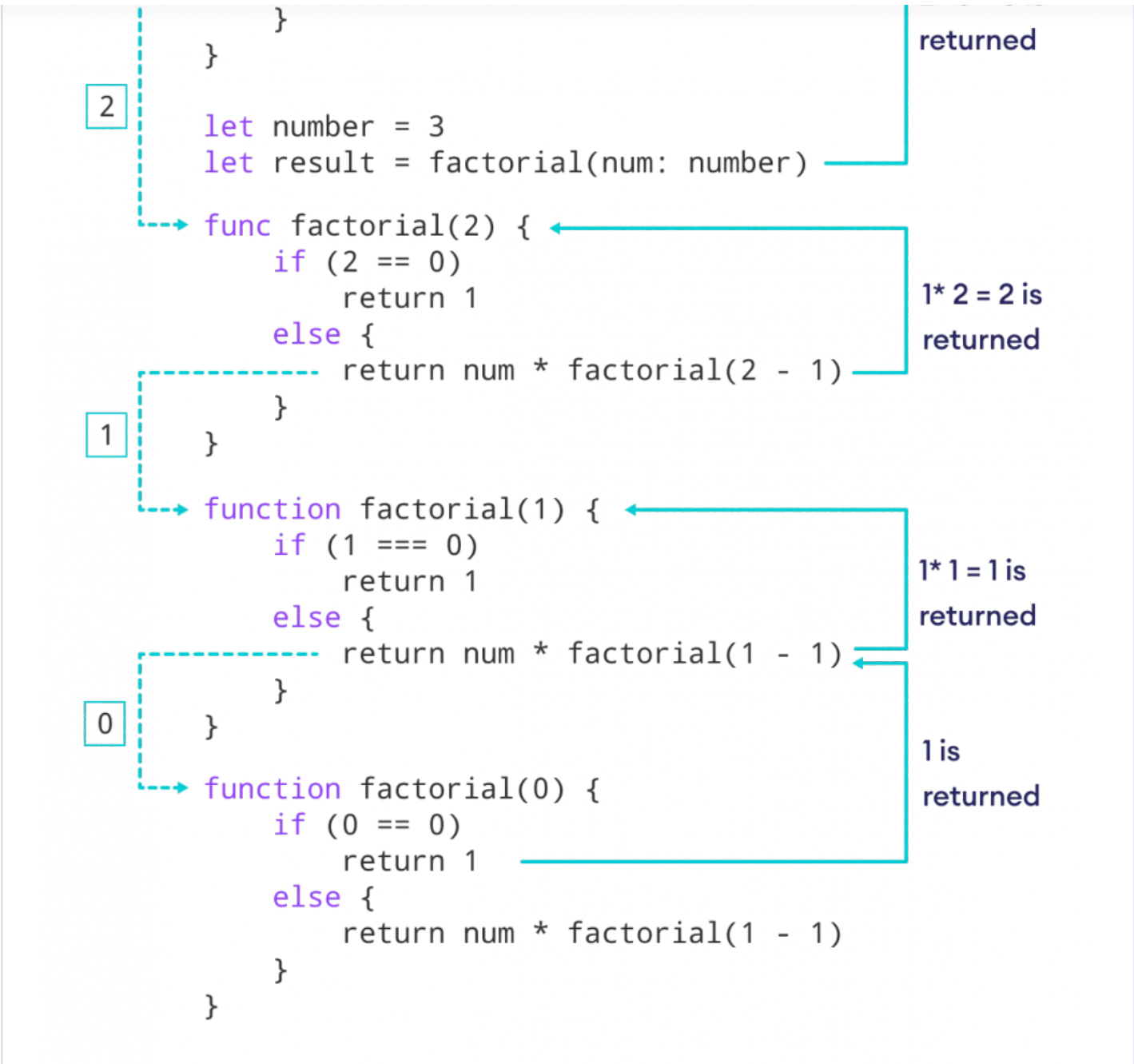
In the above example, we have a recursive function named `factorial()`. Notice the statement

```
return num * factorial(num: num - 1)
```

Here, we are recursively calling `factorial()` by decreasing the value of the `num` parameter.

- Initially, the value of `num` is **3** inside `factorial()`.
- In the next recursive call, `num` becomes **2**.
- Similarly, the process continues until `num` becomes 0.
- When `num` is equal to **0**, the `if` condition breaks the recursive call.

Working of the Program



Computing Factorial Using Recursion

Advantages and Disadvantages of Function Recursion

Below are the advantages and disadvantages of using recursion in Swift programming.

2. Disadvantages

- It takes a lot of stack space compared to an iterative program.
- It uses more processor time.
- It can be more difficult to debug compared to an equivalent iterative program.

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