Constants and Variables

Constants and variables associate a name (such as `maximumNumberOfLoginAttempts` or `welcomeMessage`) with a value of a particular type (such as the number `10` or the string `"Hello"`). The value of a *constant* can't be changed once it's set, whereas a *variable* can be set to a different value in the future.

Declaring Constants and Variables

Constants and variables must be declared before they're used. You declare constants with the `let` keyword and variables with the `var` keyword. Here's an example of how constants and variables can be used to track the number of login attempts a user has made:

```
let maximumNumberOfLoginAttempts = 10
var currentLoginAttempt = 0
```

This code can be read as:

"Declare a new constant called `maximumNumberOfLoginAttempts`, and give it a value of `10`. Then, declare a new variable called `currentLoginAttempt`, and give it an initial value of `0`."

In this example, the maximum number of allowed login attempts is declared as a constant, because the maximum value never changes. The current login attempt counter is declared as a variable, because this value must be incremented after each failed login attempt.

You can declare multiple constants or multiple variables on a single line, separated by commas:

```
var x = 0.0, y = 0.0, z = 0.0
```

> NOTE
>
> If a stored value in your code won't change, always declare it as a constant with the `let` keyword. Use variables only for storing values that need to be able to change.

Type Annotations

You can provide a *type annotation* when you declare a constant or variable, to be clear about the kind of values the constant or variable can store. Write a type annotation by placing a colon after the constant or variable name, followed by a space, followed by the name of the type to use.

This example provides a type annotation for a variable called `welcomeMessage`, to indicate that the variable can store `String` values:

```
var welcomeMessage: String
```

The colon in the declaration means "...of type...," so the code above can be read as:

"Declare a variable called `welcomeMessage` that's of type `String`."

The phrase "of type `String`" means "can store any `String` value." Think of it as meaning "the type of thing" (or "the kind of thing") that can be stored.

The `welcomeMessage` variable can now be set to any string value without error:

```
welcomeMessage = "Hello"
```

You can define multiple related variables of the same type on a single line, separated by commas, with a single type annotation after the final variable name:

```
var red, green, blue: Double
```

> NOTE
>
> It's rare that you need to write type annotations in practice. If you provide an initial value for a constant or variable at the point that it's defined, Swift can almost always infer the type to be used for that constant or variable, as described in Type Safety and Type Inference. In the `welcomeMessage` example above, no initial value is provided, and so the type of the `welcomeMessage` variable is specified with a type annotation rather than being inferred from an initial value.

Naming Constants and Variables

Constant and variable names can contain almost any character, including Unicode characters:

```
let π = 3.14159
let 你好 = "你好世界"
let 🐶🐮 = "dogcow"
```

Constant and variable names can't contain whitespace characters, mathematical symbols, arrows, private-use Unicode scalar values, or line- and box-drawing characters. Nor can they begin with a number, although numbers may be included elsewhere within the name.

Once you've declared a constant or variable of a certain type, you can't declare it again with the same name, or change it to store values of a different type. Nor can you change a constant into a variable or a variable into a constant.

> NOTE
>
> If you need to give a constant or variable the same name as a reserved Swift keyword, surround the keyword with backticks (`) when using it as a name. However, avoid using keywords as names unless you have absolutely no choice.

You can change the value of an existing variable to another value of a compatible type. In this example, the value of `friendlyWelcome` is changed from `"Hello!"` to `"Bonjour!"`:

```
var friendlyWelcome = "Hello!"
friendlyWelcome = "Bonjour!"
// friendlyWelcome is now "Bonjour!"
```

Unlike a variable, the value of a constant can't be changed after it's set. Attempting to do so is reported as an error when your code is compiled:

```
let languageName = "Swift"
languageName = "Swift++"
// This is a compile-time error: languageName cannot be changed.
```

Printing Constants and Variables

You can print the current value of a constant or variable with the `print(_:separator:terminator:)` function:

```
print(friendlyWelcome)
// Prints "Bonjour!"
```

The `print(_:separator:terminator:)` function is a global function that prints one or more values to an appropriate output. In Xcode, for example, the `print(_:separator:terminator:)` function prints its output in Xcode's "console" pane. The `separator` and `terminator` parameter have default values, so you can omit them when you call this function. By default, the function terminates the line it prints by adding a line break. To print a value without a line break after it, pass an empty string as the terminator—for example, `print(someValue, terminator: "")`. For information about parameters with default values, see Default Parameter Values.

Swift uses *string interpolation* to include the name of a constant or variable as a placeholder in a longer string, and to prompt Swift to replace it with the current value of that constant or variable. Wrap the name in parentheses and escape it with a backslash before the opening parenthesis:

```
print("The current value of friendlyWelcome is \(friendlyWelcome)")
// Prints "The current value of friendlyWelcome is Bonjour!"
```

> NOTE
>
> All options you can use with string interpolation are described in String Interpolation.