

CS330: Programming Language Project (PLP)

Assignment 3: Data types and naming conventions

Research the naming conventions in your language for variables (i.e., do they have to start with lowercase letters? Can they start with numbers? Symbols? do programmers use underscores, as in "last_name", or do they use camel case (lastName))?

Variable names are composed of letters, digits, and underscores, and must begin with either a letter or an underscore. Swift is case sensitive so upper and lowercase letters are distinct.¹ Swift uses the camelcase naming convention, in which the first word of a variable name is in lowercase and is followed by a capital letter for each subsequent word (e.g. highScore). Names can't begin with a number, but can include them in any other position. Additionally, variable names can't contain whitespace characters or symbols.²

Write a piece of code that creates variable of each of these common data types and follows the naming conventions:

- int
- String
- floating-point number
- Boolean
- array/list
- hash/dictionary

```
var integerExample : Int
var string : String
var floatExample : Float
var booleanExample : Bool
var arrayExample = [Int] ()
var dictionaryExample = [Int: String]()
|
```

In your code, experiment with doing different things with the data types: can you add ints and floats? If you do, is the resulting variable an int (narrowing conversion) or a float (widening conversion)? Can you put different data types in the same array or list? Can one data type be converted to another (int to float, string to int, etc)?

- In order to add ints to floats, you must first convert them to the same data type, and the resulting variable will either be an int or a float depending on your choice.
- Arrays can only hold one data type.
- You can convert a variable to another data type by using the format `Int(currentVariableName) ?? 0` if you want to convert to an Int etc..³

¹ "Swift - Variables." *Tutorialspoint*, www.tutorialspoint.com/swift/swift_variables.htm.

² "Variables and Constants in Swift." *AndyBargh.com*, 18 July 2019, andybargh.com/variables-and-constants-in-swift/.

³ Pranit KothariPranit Kothari 8, et al. "How to Do Arithmetic between Int and Float in Swift?" Stack Overflow, 1 Oct. 1963, stackoverflow.com/questions/24300480/how-to-do-arithmetic-between-int-and-float-in-swift.

Discussion Questions:

1. **What are the naming requirements for variables in your language? What about naming conventions? Are they enforced by the compiler/interpreter, or are they just standards in the community?**

- CAN START WITH: letters and underscores
- CAN CONTAIN: letters, digits, underscores, some unicode characters
- CAN'T CONTAIN: whitespace characters, symbols
- USES CAMELCASE naming convention, e.g. firstLast
- Case Sensitive

The case sensitivity is just a standard in the community but the remaining conventions are enforced by the compiler.

2. **Is your language statically or dynamically typed?**

Swift is statically typed, meaning that type checks are performed before run-time.⁴

3. **Strongly typed or weakly typed?**

Swift is strongly typed, meaning that it checks that the correct data type is being used in a variable or function at compile time.

4. **If you put this line (or something similar) in a program and try to print x, what does it do? If it doesn't compile, why? Is there something you can do to make it compile? `x = "5" + 6`**

It does not compile because we can't add values with different data types. We would have to convert "5" into an Int, then add it to 6.

```
7
8  var x = 6
9  var y = "5"
10 var a = Int(y) ?? 0
11 var z = x + a
12 print (z)
13
```

⁴ Tony Lin Tony Lin 78044 silver badges1616 bronze badges, et al. "How Do We Determine a Language Is Dynamic or Static? an Example Is Swift." *Stack Overflow*, 1 July 1968, stackoverflow.com/questions/55213572/how-do-we-determine-a-language-is-dynamic-or-static-an-example-is-swift/55215976.

- 5. Describe the limitations (or lack thereof) of your programming language as they relate to the coding portion of the assignment (adding ints and floats, storing different types in lists, etc). Are there other restrictions or pitfalls that the documentation mentions that you need to be aware of?**

Swift is a relatively new programming language, so it's not as easy to find online support as it is for some other languages. It's also pretty strict and doesn't allow addition of or arrays containing different data types. As of right now, there don't seem to be any other pitfalls that the documentation mentions, but I've found that sometimes the code has extra bits that weren't really made clear at first. For example, when converting a string to an Int, the documentation simply said use Int(), but it turns out that we also need to specify ?? 0, referred to as nil coalescing, which means that it will try to turn the string to an int, but if the value is invalid, it will use 0 instead. This is a direct example of Swift's goal to be extra clear on what each code needs to do.⁵

- 6. How do type conversions work in your language? Are the conversions narrowing or widening, and do they work by default or do they have to be declared by the programmer?**

Type conversions have to be declared by the programmer in Swift. I mentioned how to convert a String to an Int above but generally speaking, you use the data type and wrap the desired variable in parentheses. It can be narrowing or widening depending on whether you are converting a larger value into a smaller one or vice versa.

⁵ Hudson, Paul. "How to Convert a String to an Int." *Hacking with Swift*, Hacking with Swift, 19 Sept. 2019, www.hackingwithswift.com/example-code/language/how-to-convert-a-string-to-an-int.