

Lab 02: Python Variables

Variables

Variables are containers for storing data values.

Creating Variables

Python has no command for declaring a variable.

A variable is created the moment you first assign a value to it.

Example

```
x = 5  
y = "John"  
print(x)  
print(y)
```

Variables do not need to be declared with any particular *type*, and can even change type after they have been set.

Example

```
x = 4          # x is of type int  
x = "Sally"    # x is now of type str  
print(x)
```

Casting

If you want to specify the data type of a variable, this can be done with casting.

Example

```
x = str(3)     # x will be '3'  
y = int(3)     # y will be 3  
z = float(3)   # z will be 3.0
```

```
print(x)  
print(y)  
print(z)
```

Get the Type

You can get the data type of a variable with the `type()` function.

Example

```
x = 5
y = "John"
print(type(x))
print(type(y))
```

Single or Double Quotes?

String variables can be declared either by using single or double quotes:

```
x = "John"
print(x)
#double quotes are the same as single quotes:
x = 'John'
print(x)
```

Case-Sensitive

Variable names are case-sensitive.

Example

This will create two variables:

```
a = 4
A = "Sally"
#A will not overwrite a
```

```
print(a)
```

```
print(A)
```

Variable Names

A variable can have a short name (like x and y) or a more descriptive name (age, carname, total_volume).

Rules for Python variables:

- A variable name must start with a letter or the underscore character
- A variable name cannot start with a number
- A variable name can only contain alpha-numeric characters and underscores (A-z, 0-9, and _)
- Variable names are case-sensitive (age, Age and AGE are three different variables)
- A variable name cannot be any of the Python keywords.

```
myvar = "John"
my_var = "John"
_my_var = "John"
myVar = "John"
MYVAR = "John"
myvar2 = "John"
```

```
print(myvar)
print(my_var)
print(_my_var)
print(myVar)
print(MYVAR)
print(myvar2)
```

```
2myvar = "John"
my-var = "John"
my var = "John"
```

Multi Words Variable Names

Variable names with more than one word can be difficult to read.

There are several techniques you can use to make them more readable:

Camel Case

Each word, except the first, starts with a capital letter:

```
myVariableName = "John"
```

Pascal Case

Each word starts with a capital letter:

```
MyVariableName = "John"
```

Snake Case

Each word is separated by an underscore character:

```
my_variable_name = "John"
```

Many Values to Multiple Variables

Python allows you to assign values to multiple variables in one line:

Example

```
x, y, z = "Orange", "Banana", "Cherry"
print(x)
print(y)
print(z)
```

One Value to Multiple Variables

And you can assign the *same* value to multiple variables in one line:

Example

```
x = y = z = "Orange"
print(x)
print(y)
print(z)
```

Unpack a Collection

If you have a collection of values in a `list`, `tuple` etc. Python allows you to extract the values into variables. This is called *unpacking*.

Example

Unpack a list:

```
fruits = ["apple", "banana", "cherry"]
x, y, z = fruits
print(x)
print(y)
print(z)
```

Output Variables

The Python `print()` function is often used to output variables.

Example

```
x = "Python is awesome"  
print(x)
```

In the `print()` function, you output multiple variables, separated by a comma:

Example

```
x = "Python"  
y = "is"  
z = "awesome"  
print(x, y, z)
```

You can also use the `+` operator to output multiple variables:

Example

```
x = "Python "  
y = "is "  
z = "awesome"  
print(x + y + z)
```

Notice the space character after `"Python "` and `"is "`, without them the result would be `"Pythonisawesome"`.

For numbers, the `+` character works as a mathematical operator:

Example

```
x = 5  
y = 10  
print(x + y)
```

In the `print()` function, when you try to combine a string and a number with the `+` operator, Python will give you an error:

Example

```
x = 5
y = "John"
print(x + y)
```

The best way to output multiple variables in the `print()` function is to separate them with commas, which even support different data types:

Example

```
x = 5
y = "John"
print(x, y)
```

Global Variables

Variables that are created outside of a function (as in all of the examples in the previous pages) are known as global variables.

Global variables can be used by everyone, both inside of functions and outside.

Example

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Create a variable outside of a function, and use it inside the function

```
x = "awesome"

def myfunc():
    print("Python is " + x)

myfunc()
```

If you create a variable with the same name inside a function, this variable will be local, and can only be used inside the function. The global variable with the same name will remain as it was, global and with the original value.

Example

Create a variable inside a function, with the same name as the global variable

```
x = "awesome"

def myfunc():
    x = "fantastic"
    print("Python is " + x)

myfunc()

print("Python is " + x)
```

The global Keyword

Normally, when you create a variable inside a function, that variable is local, and can only be used inside that function.

To create a global variable inside a function, you can use the `global` keyword.

Example

If you use the `global` keyword, the variable belongs to the global scope:

```
def myfunc():
    global x
    x = "fantastic"

myfunc()

print("Python is " + x)
```

Also, use the `global` keyword if you want to change a global variable inside a function.

Example

To change the value of a global variable inside a function, refer to the variable by using the `global` keyword:

```
x = "awesome"

def myfunc():
    global x
    x = "fantastic"

myfunc()

print("Python is " + x)
```