Python

Variables, Types & Operators

@kabirbaidhya

Before We Begin

Reflections

What we've learned from the past lessons.

1. Python - Hello World!
2. Git
3. Version Control
4. GitHub

Note: If you're not aware of these. Read them at https://github.com/kabirbaidhya/learn-python-django-web

Variables

> A variable is a symbolic name for (or reference to) information. The variable's name represents what information the variable contains.

http://www.cs.utah.edu/~germain/PPS/Topics/variables.html

For Instance

`foo` and `bar` could be variables that are just symbolic names which represents some information in the memory.

```
# Variable foo contains "Some Information"
foo = "Some Information"

# And variable bar contains 15.04
bar = 15.64

# Now variable `foo` can be used to get the reference of th
print("It contains", foo)

# And they could be used in expressions too
print("Result = ", 5 * bar + 2)
```

Variables in Python

- Dynamically typed.
- Every variable is an object.
- Names are case sensitive.
- Assigned to a value using `=` operator eg: `foo = 10`.
- Name can contain letters, underscores (`_`) followed by numbers.
- **Naming Convention**: lowercase names using underscore `_` to separate words. eg: `first_name`, `last_name`, etc.

For instance

Let's say we have a numeric value `20.0` and we want to store it as the radius of a circle.
We do that like this.

```
radius = 20.0
```

Here,

1. `radius` is a variable.
2. `20.0` is the value assigned to that variable.

For instance

Suppose that we need to store another constant value `3.14` as pi.

We can do that as well.

```
PI = 3.14
```

Now, `PI` is another variable that holds 3.14.

Using them in expressions

Let's do some computation with these values we have now.

```
# Values we have
radius = 20.0
PI = 3.14

# Compute area of the circle
area = PI * radius * radius

# Print the results
print("Area of Circle =", area)
```

In a Nutshell

A variable is a symbol that stand in for a value in the program.

Example 1

```
first_name = "Kabir"
last_name = "Baidhya"
home_town = "Kathmandu, Nepal"

print("Hi! I am", first_name, last_name, ".")
print("I'm from", home_town, ".")
```

Output:

```
Hi! I am Kabir Baidhya .
I'm from Kathmandu, Nepal .
```

Data Types

Buit-in Data types

- **Numeric**: int, float, long
- **Boolean**: bool
- **Sequences**: str, list, tuple, bytes
- **Mappings**: dict
- **Sets**: set, frozen set

Immutable & Mutable types

1. Immutable types
    - int, float, long, str, tuple, frozen set, etc.
2. Mutable types
    - list, dict, set, etc.

Integer

Integers are positive or negative whole numbers with no decimal points.
In python 2.x there are two `int` types: `int` and `long`.

But in python 3.x onwards both have been unified into `int` and it behaves as `long`.

```
total_lessons = 24
```

Float

They represent real numbers and are written with a decimal point.

```
percentage = 70.05
```

Boolean

Variables with boolean type can represent only two values `True` or `False`.

```
success = True
failure = not success
```

Example 2: Basic data types

```
an_integer = 6
a_floating_point = 17.60
a_boolean = True
a_string = "Foo"

print("Integer value =", an_integer)
print("Float value =", a_floating_point)
print("Boolean value =", a_boolean)
print("String value =", a_string)
```

Output:

```
Integer value = 6
Float value = 17.60
Boolean value = True
String value = Foo
```

Operators

Arithmetic Operators

Python supports all the basic arithmetic operators just like any other programming languages.

Operator	Operation	Example
+	Addition	a + b
_	Subtration	a - b
*	Multiplication	a * b
/	Division	a / b
**	Exponentiation	a ** b
%	Modulo	a % b

Comparison Operators

Common comparison operators in python are `<`, `>`, `==`, `>=`, `<=`, and `!=`.
All of these operators return boolean results.

Operator	Comparison	Example
>	Is greater than	a > b
<	Is less than	a < b
==	Is equal to	a == b
>=	Is greater than or equal to	a >= b
<=	Is less than or equal to	a <= b
!=	Is not equal to	a != b

Logical Operators

All of these operators return boolean results.

Operator	Operation	Example
and	Logical AND	a and b
or	Logical OR	a or b
not	Logical NOT	not a

Example 3

Try these in Python shell.

```
>>> (1 * 4) + (4 / 2) - (3 * 2)
>>> 7 % 3
>>> 2 ** 3
>>> 1 > 2
>>> 1 >= 1
>>> 1 < 5
>>> 1 <= 5
>>> 7 == 5
>>> 8 != 5
>>> 7 > 2 and 5 < 8
>>> 7 > 10 or 5 < 8
>>> not (5 > 7)
```

Exercise 1

Write a program to calculate the diameter, circumference, and the area of circle using the value of `radius` and constant `PI = 3.14159`.

Exercise 2

Write a program to calculate the distance between two points represented by coordinates `(x1, y1)` and `(x2, y2)` respectively.

Use Distance Formula

$$d = \sqrt{(x2 - x1)^2 + (y2 - y1)^2}$$

Exercise 3

Write a program to compute the possible values of `x` from a quadratic equation $ax^2 + bx + c = 0$ (a â‰ 0) using the quadratic equation formula.

Use Quadratic Formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

User Input

Input

Getting the user input is an important part of every program.
In python you can use the `input` function to get the user input easily.

```
# Get the input and store it in the variable.
name = input("Please enter your name: ")

# Print the entered value.
print("Hi", name)
```

Note: `input` only works in python3. You need to use `raw_input` if you're using python2.

Exercise 4

Make changes in the program you wrote for exercise 1 to get the radius from the user.

Exercise 5

Make changes in the program you wrote for exercise 2 to get x1, y1 & x2, y2 from the user.

Exercise 6

Make changes in the program you wrote for exercise 3 to get the values of a, b & c from the user.

Exercise 7

Write a program that asks for a number and prints if it's an even number or not.

Read More?

Links

1. https://docs.python.org/3.5/tutorial/introduction.html
2. https://www.digitalocean.com/community/tutorials/how-to-use-variables-in-python-3
3. https://learnpythonthehardway.org/book/ex5.html
4. http://www.pythonforbeginners.com/basics/python-variables
5. https://www.learnpython.org/en/Variables_and_Types

More links

6. https://en.wikibooks.org/wiki/Python_Programming/Data_Types
7. https://docs.python.org/3.6/reference/expressions.html#operator-precedence

Thank You

@kabirbaidhya

kabirbaidhya@gmail.com