



Basic Data Types



Table of Contents



- ▶ Variables
- ▶ Introduction to Data Types
- ▶ Strings
- ▶ Numeric Types
- ▶ Boolean
- ▶ Type Conversion

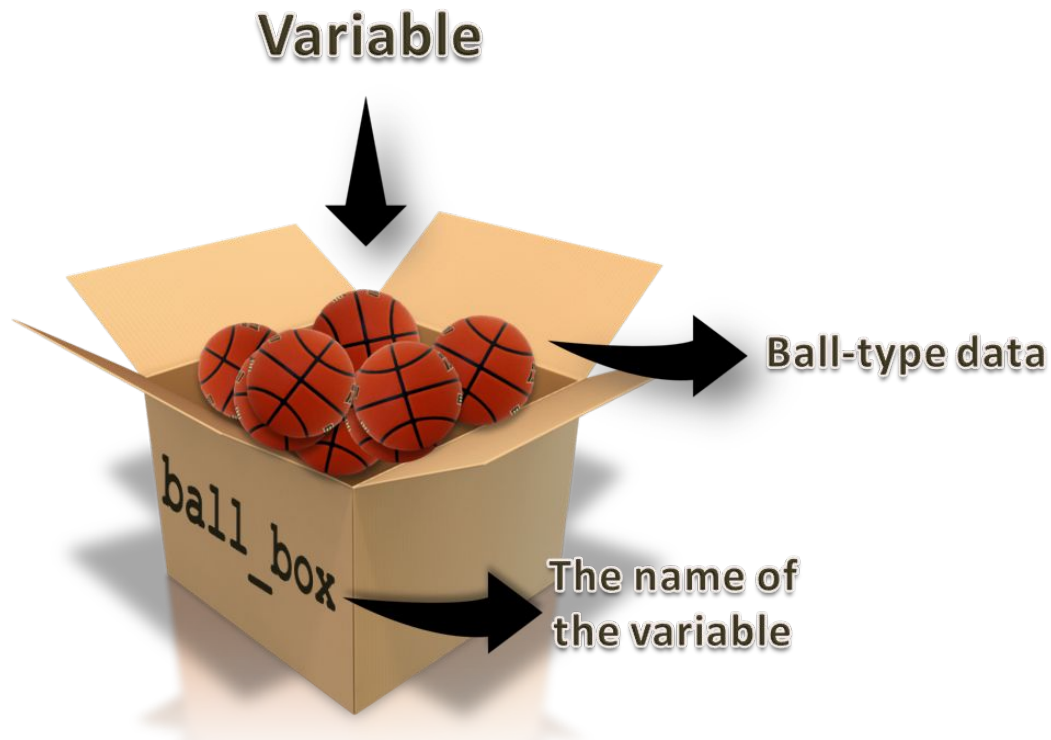


Variables





Variables : refreshing





Naming Variables



Table of Contents

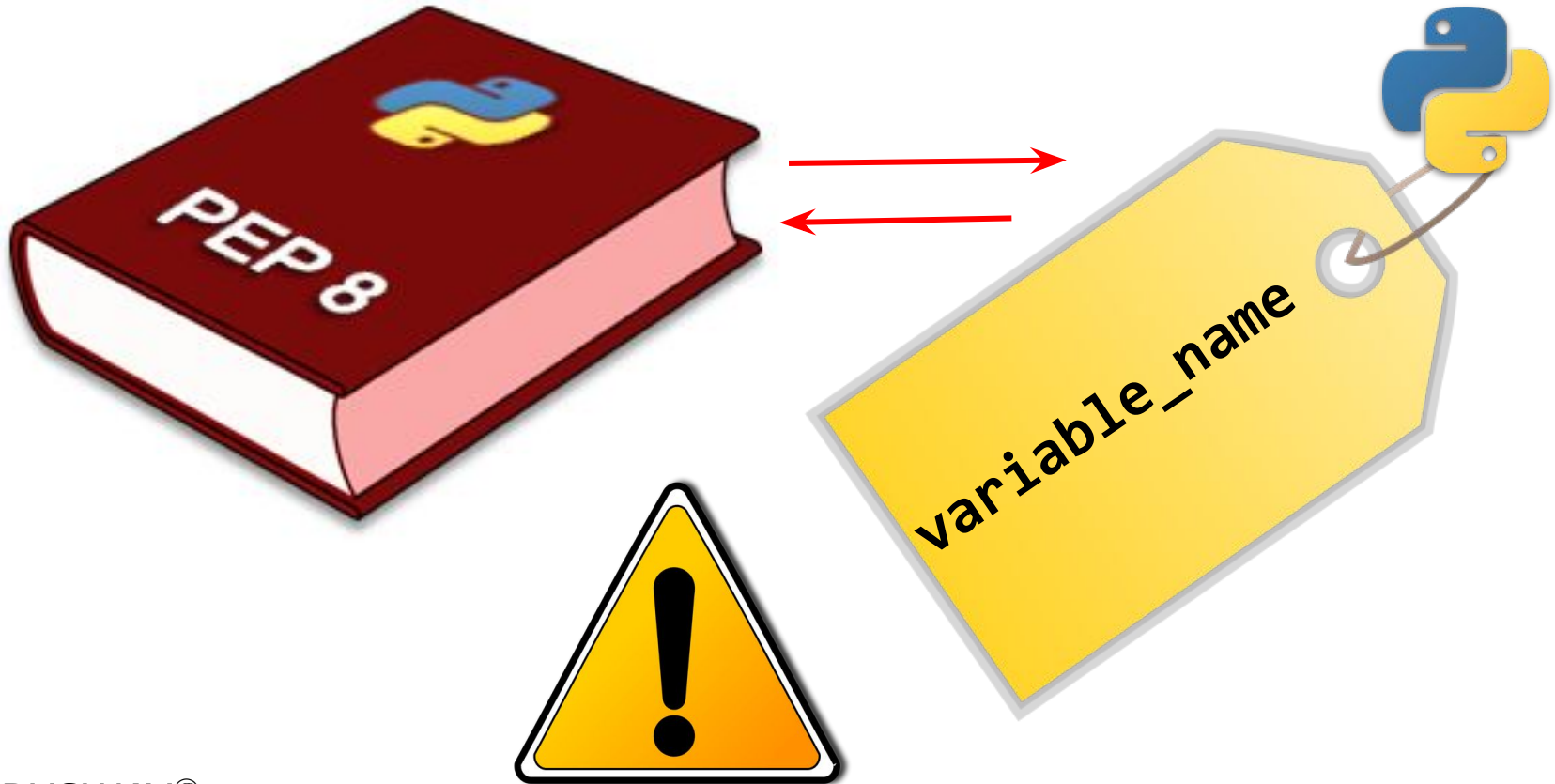


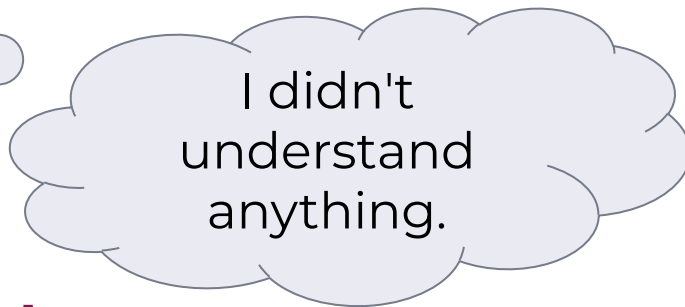
- ▶ General Description
- ▶ Conventional (PEP 8) Naming Rules



General Description

General Description





Con_PEP_N_Rl





Con_PEP_N_Rl



bad example of naming
a variable



Conventional (PEP 8)
Naming Rules



Variables



variable name = value

```
planet = 'jupyter'  
price = 140  
pi_number = 3.14
```

The declaration
happens automatically
when you **assign** a
value to a variable.



Variables

► Task

- ▶ Create 3 variables and assign different values to them.
- ▶ Display each of them in Python Playground using `print()` function.



Variables



```
my_age = 33  
your_age = 30  
my_age = your_age  
print(my_age)
```

What is the output? Try to figure out in your mind...





Variables

```
my_age = 33  
your_age = 30  
my_age = your_age  
print(my_age)
```

30



Conventional (PEP 8) Naming Rules

► Some basic naming conventions

- Choose **lowercase** words and use underscore to split the words

```
variable = 3.14  
var_one = 'something'
```



Conventional (PEP 8) Naming Rules

► Some basic naming conventions

- Do not use `'1'` (**lowercase letter “L”**) as single character variable.

```
l = 3.14  # This is lowercase letter el
I = 3.14  # This is uppercase letter eye
1 = 'something wrong'  # This is number one.
```




Conventional (PEP 8) Naming Rules

► Some basic naming conventions

- Do not use `'0'` (**uppercase letter “O”**) as single character variable.

```
time_0 = '3.14'    # This is uppercase letter “O”  
time_0 = '3.14'    # This is number zero
```



Some Important PEP 8 Rules

- ▶ **Some basic naming conventions (reserved words)**

- ▶ Do not use specific Python keywords such as :

False	class	finally	is	return
None	continue	for	lambda	try
True	def	from	nonlocal	while
and	del	global	not	with
as	elif	if	or	yield
assert	else	import	pass	break
except	in	raise		

Pythonic Rules



Examine these samples carefully

2me



data4me



Big boss



first!



big-boss



xy#@!v



last_name



\$price





Some Important PEP 8 Rules

► Some basic naming conventions

- The name of the variable must be legible, meaningful and relevant to the type of value

Good

```
students = ...
```

Bad

```
s = ... or st = ...
```



Some Important PEP 8 Rules

► Some basic naming conventions

- The name of the variable must be legible, meaningful and relevant to the type of value

Good

```
students = ...
```

```
# Big Data
```

```
big_data = ...
```

Bad

```
s = ... or st = ...
```

```
# Big Data
```

```
b_dt = ...
```



Some Important PEP 8 Rules

► Some basic naming conventions

- The name of the variable must be legible, meaningful and relevant to the type of value

Good

```
students = ...
```

```
# Big Data
```

```
big_data = ...
```

```
# Average income of February
```

```
avg_income_feb = ...
```

Bad

```
s = ... or st = ...
```

```
# Big Data
```

```
b_dt = ...
```

```
# Average income of February
```

```
average_income_february = ..
```



► Naming Variable

amount of rotten fruits

the list of prime numbers

the list of mathematics exam scores

What can be the **Name** of these sentences in terms of variables.





Naming variable

```
amount of rotten fruits
```

- **Good samples :**
 - `fruit_rotten = 33 # kg.`
 - `amount_rotten_fruits = 33 # kg.`



Naming variable

the list of prime numbers

- **Good samples :**
 - prime_list
 - prime_no
 - list_prime
 - num_prime



Naming variable

the list of mathematics exam scores


- **Good samples :**
 - math_scores
 - score_maths



Variables : refreshing



Creating a variable is very simple in Python.

All you need to do is specify the variable name and then assign a value to it using  `=`

```
variable name = value
```

```
planet = 'jupyter'
```

```
price = 140
```

**The declaration
happens automatically
when you assign a
value to a variable.**



Variables



Assigning a value to a variable.

```
x = y = z = "same"
```

```
print(x)
```

```
print(y)
```

```
print(z)
```

What is the output?





Variables



The output

same
same
same

Write a Python code on Playground :

Hint : Use int value of 30, 31, 28 only once.

Which months have **31** days and which have **30** or **28**? Let's assign the number of days (30 or 31 or 28) to the months (the variables will be the name of the months) in totally **three** code **lines** then print their number of days in order of the months as follows.



```
print(january, february, march, april, may, june, july, august, september, october, november, december)
```

31 28 31 30 31 30 31 31 30 31 30 31



Students, write your response!



Pear Deck

Pear Deck Interactive Slide
Do not remove this bar

Variables



A probable answer :

```
january = march = may = july = august = october = december = 31
```

```
# multi assignments in a single line
```

```
april = june = september = november = 30
```

```
february = 28
```

```
print(january, february, march, april, may, june, july, august, september, october,  
november, december)
```

If we don't know the value of a variable, what can we assign to it? For example :

The ages of instructors :

thomas = 33

marry = 28

walter = ?

isabella = 46



Pear Deck



Students, write your response!

Pear Deck Interactive Slide
Do not remove this bar



Variables



```
thomas = 33  
marry = 28  
walter = None  
isabella = 46
```





Variables



Assigning a value to a variable.

```
website = "apple.com"  
print(website)
```

```
# assigning a new variable to website  
website = "clarusway.com"
```

```
print(website)
```

What is the output?



Variables



The output

apple.com
clarusway.com



Variables



Assigning a value to a variable.

```
first_number = 100  
second_number = first_number  
print(second_number)
```

What is the output?





Variables



The output

100

Variables



Assigning a value to a variable.

```
x = 15
```

```
y = 33
```

```
z = x
```

```
x = y
```

```
print(x)
```

```
print(y)
```

```
print(z)
```

What is the output?



Variables



The output

```
x = 33
```

```
y = 33
```

```
z = 15
```

Variables



Assigning a value to a variable.

```
a, b, c = 5, 3.2, "Hello"
```

```
print(a)
```

```
print(b)
```

```
print(c)
```

What is the output?





Variables



The output

5

3.2

Hello



Variables

- Pay attention to the value of variables and how they change.

```
man = "andrew"  
color = "green"  
age = 32  
pi = 3.14  
color = "yellow"  
age = 44  
man = "joseph"  
  
print(man, age, color)
```

Output

```
joseph 44 yellow
```



str

bool

Introduction to Data Types

int



Introduction to Data Types



► Some simple data types commonly used in Python.

- String,
- Integer,
- Float,
- Boolean.





str

"2020"

Strings

"string is the most used type"

"i have 3 lb. of apple"



Strings



- ▶ If you want to work with any **textual** characters in your code, you have to work with strings.

```
my_text = 'being a good person'  
print(my_text)
```

String type is
called **str**.



```
type(variable)
```





Strings

- ▶ If you want to work with any **textual** characters in your code, you have to work with strings.

```
my_text = 'being a good person'  
print(my_text)
```

```
being a good person
```

String type is
called **str**.

- ▶ Strings are identified as a set of characters represented in the **single** or **double** quotes.

`type(variable)`

Write down the followings on your Playground as `str` type and then print them...

- `joseph@clarusway.com`
- `632`
- `It's okay!`



Students, follow the instructions on the slide



Strings

- ▶ **Let's** do some practices which cover string type.

```
1 str_number = '1923'  
2 str_sign = '%(#&*?-'  
3  
4  
5 print(str_number)  
6 print(str_sign)  
7 print(type(str_number), type(str_sign))  
8  
9
```



Strings

- **Let's** do some practices which cover string type.

```
1 str_number = '1923'  
2 str_sign = '%(#&*?-'  
3  
4  
5 print(str_number)  
6 print(str_sign)  
7 print(type(str_number), type(str_sign))  
8  
9
```

Output

```
1923  
%(#&*?-  
<class 'str'> <class 'str'>
```



int

Numeric Types

float



Numeric Types

- ▶ Three basic numeric types in Python :

- Integers
- Floats
- Complexes



Numeric Types

- **Integer** types are whole numbers which don't contain decimal point.

```
my_integer = 40
negative_num = -18

print(my_integer)
print(negative_num)
```

Signed integer
type is called
int.



Numeric Types

- **Integer** types are whole numbers which don't contain decimal point.

```
my_integer = 40
negative_num = -18

print(my_integer)
print(negative_num)
```

```
40
-18
```

Signed integer
type is called
int.



Numeric Types

- **Float** types stand for real numbers with a decimal point.

```
my_float = 40.0
negative_float = -18.66

print(my_float)
print(negative_float)
```

Floating point
type is called
float.



Numeric Types

- **Float** types stand for real numbers with a decimal point.

```
my_float = 40.0  
negative_float = -18.66  
  
print(my_float)  
print(negative_float)
```

```
40.0  
-18.66
```

Floating point
type is called
float.



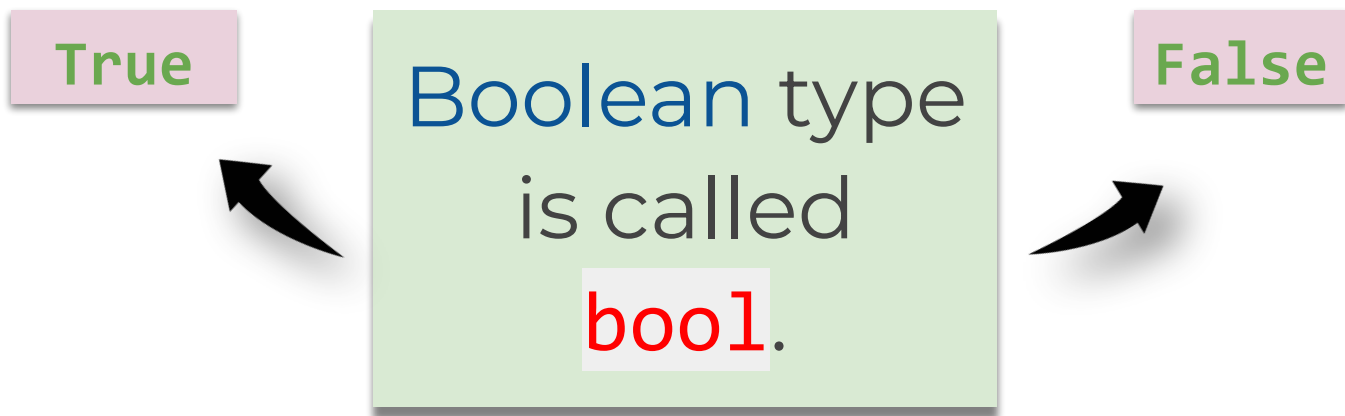
Boolean





Boolean

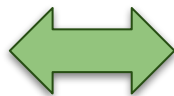
- ▶ Boolean types' values are the two constant objects **False** and **True**.





Type Conversion

int



str

Stretch Break!

Let's take 1 minute to stretch

- **stretch your neck**



Students, follow the instructions on the slide



Type Conversion



We can print the types of data using `type()` function

```
my_data = 'I am string'  
print(type(my_data))
```



Type Conversion



We can print the types of data using `type()` function

```
my_data = 'I am string'  
print(type(my_data))
```

```
<class 'str'>
```



Type Conversion



Type conversion functions.

- `str()` converts to **string** type
- `int()` converts to **signed integer** type
- `float()` converts to **floating point** type

The value of any type in Python can be converted to a `str`.



Students choose an option

Pear Deck Interactive Slide
Do not remove this bar



Type Conversion



Converting **float** to **str**

```
pi = 3.14  
  
converted_pi = str(pi)  
print(converted_pi)  
print(type(converted_pi))
```



Type Conversion



Converting **float** to **str**

```
pi = 3.14  
  
converted_pi = str(pi)  
print(converted_pi)  
print(type(converted_pi))
```

```
3.14  
<class 'str'>
```

Type Conversion



Converting `float` to `int`

```
pi = 3.14
```

```
converted_pi = int(pi)
```

```
print(converted_pi)
```

```
print(type(converted_pi))
```

What is the
output?



Students, write your response!



Type Conversion



Converting `float` to `int`

```
pi = 3.14  
  
converted_pi = int(pi)  
print(converted_pi)  
print(type(converted_pi))
```

```
3  
<class 'int'>
```



Type Conversion



Converting `int` to `float`

```
no = 3
```

```
converted_no = float(no)
```

```
print(converted_no)
```

```
print(type(converted_no))
```

Type Conversion



Converting `int` to `float`

```
no = 3
```

```
converted_no = float(no)
```

```
print(converted_no)
```

```
print(type(converted_no))
```

```
3.0
```

```
<class 'float'>
```



Type Conversion

input :

```
1 x = 39
2 v = "11"
3 y = "2.5"
4 z = "I am at_"
5
6 print(x-int(v))
7 print(x-float(y))
8 print(z+str(x))
9
```

output :

```
1 28
2 36.5
3 I am at_39
4
5
```



Type Conversion

input :

```
1 x = 39
2 v = "11"
3 y = "2.5"
4 z = "I am at_"
5
6 print(x-int(v))
7 print(x-float(y))
8 print(z+str(x))
9
```

$x - \text{int}("11") = 39 - 11 = 28$

output :

```
1 28
2 36.5
3 I am at_39
4
5
```




Type Conversion

input :

```
1 x = 39
2 v = "11"
3 y = "2.5"
4 z = "I am at_"
5
6 print(x-int(v))
7 print(x-float(y))
8 print(z+str(x))
9
```

$x - \text{int}("11") = 39 - 11 = 28$

$x - \text{float}("2.5") = 39 - 2.5 = 36.5$

output :

```
1 28
2 36.5
3 I am at_39
4
5
```



Type Conversion

input :

```
1 x = 39
2 v = "11"
3 y = "2.5"
4 z = "I am at_"
5
6 print(x-int(v))
7 print(x-float(y))
8 print(z+str(x))
9
```

$x - \text{int}("11") = 39 - 11 = 28$

$x - \text{float}("2.5") = 39 - 2.5 = 36.5$

$z + \text{str}(39) = \text{"I am at_"} + \text{"39"} = \text{I am at_39}$

output :

```
1 28
2 36.5
3 I am at_39
4
5
```

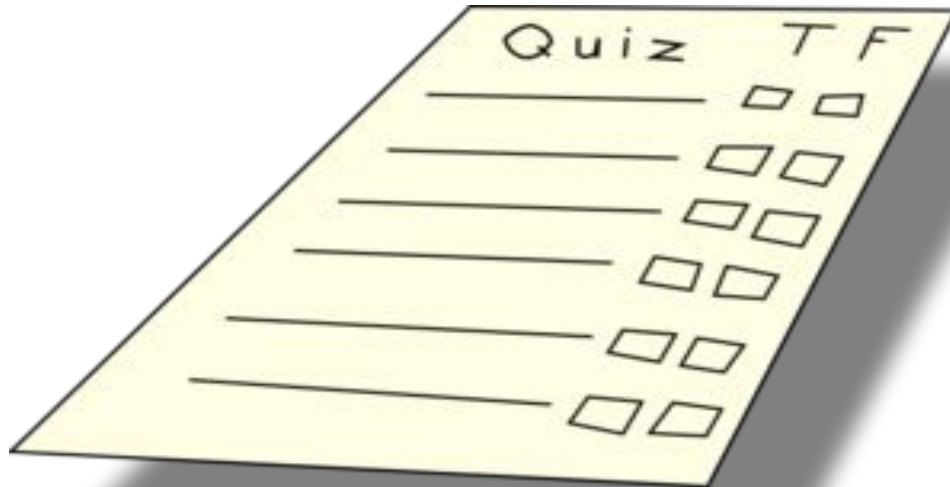


Type Conversion, Quiz



► Task

- First, Login to your LMS,
- Then, click [here](#) to complete and submit the task.





Type Conversion, Quiz



Without using any Interpreter/IDLE, just try to guess the output.

```
number_int = 123  
number_float = 1.23
```

```
number_new = number_int + number_float
```

```
print("datatype of number_int:", type(number_int))
```

```
print("datatype of number_float:", type(number_float))
```

```
print("Value of number_new:", number_new)
```

```
print("datatype of number_new:", type(number_new))
```

What is the output?





Type Conversion, Quiz



Without using any Interpreter/IDLE, just try to guess the output.

```
number_int = 123  
number_str = "456"
```

```
print("Data type of number_int:", type(number_int))  
print("Data type of number_str:", type(number_str))  
  
print(number_int + number_str)
```

What is the output?





Type Conversion, Quiz



Without using any Interpreter/IDLE, just try to guess the output.

```
number_int = 123  
number_str = "456"
```

What is the output?

```
print("Data type of number_int:", type(number_int))  
print("Data type of number_str before Type Casting:", type(number_str))  
  
number_str = int(number_str)  
print("Data type of number_str after Type Casting:", type(number_str))  
  
number_sum = number_int + number_str  
  
print("Sum of number_int and number_str:", number_sum)  
print("Data type of the sum:", type(number_sum))
```

