Python Types I: Numbers and strings

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Python tutorials

1. Older version of Python tutorial, better for beginners Actually written by Guido van Rossum.
2. Current Python docs tutorial
3. Google's Python class

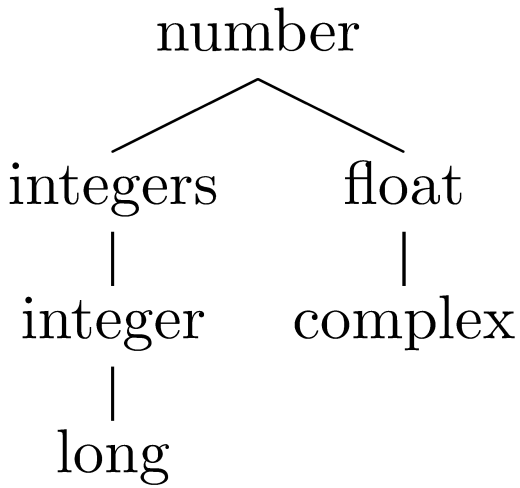
Numbers

```
>>> X = 3
>>> X
3
>>> type(3)
<class 'int'>
>>> type(X)
<class 'int'>
>>> X = 1.2
>>> type(1.2)
<class 'float'>
>>> type(X)
<class 'float'>
```

Type casting

```
>>> (X, Y) = (3, 1.2)
>>> Z = 3 + 1.2
>>> type(X), type(Y)
(<class 'int'>, <class 'float'>)
>>> type(Z)
<class 'float'>
```

Python type hierarchy



Python number types

Complex numbers

```
>>> type(0j)
<class 'complex'>
>>> 0 == 0j
True
>>> X = 3j+2
>>> type(X)
<class 'complex'>
>>> from numpy import log
>>> log(-1 + 0j)    # Works for complex number
3.141592653589793j
>>> log(-1)         # Fails for real number
nan
```

String literals

```
>>> X = "frog"
>>> type(X)
<class 'str'>
>>> Y = 'frog'
>>> type(Y)
<class 'str'>
>>> X == Y
True
```

When entering string literals, delimiters (' ' or " " or """ """) are necessary.

String literals with quotes marks

```
>>> X = "The big dog laughed and said, 'Hello, Jeremy.'"
>>> Y = 'The big dog laughed and said, "Hello, Jeremy."'
>>> X == Y
False
```

Multiline strings

```
>>> X = """
... Beautiful is better than ugly.
... Explicit is better than implicit.
... Simple is better than complex.
... Complex is better than complicated.
... """
```

Special characters in strings

```
>>> Z = "x\ty"
>>> print(Z)
x	y
>>> X = "\n Beautiful is better than ugly.\n Explicit is better
>>> print(X)

 Beautiful is better than ugly.
 Explicit is better than implicit.
 Simple is betterthan complex.
 Complex is better than complicated.
```

\t tab
\n new line

Concatenating strings

```
>>> X = "The dog"
>>> Y = " barked"
>>> X + Y              # X + Y is a new string
'The dog barked'
>>> X                  # X unchanged
'The dog'
>>> Y                  # Y unchanged; strings are immutable
' barked'
```

Casting limitations

```
>>> X = "The dog"
>>> Y = 3
>>> X + Y
Traceback (most recent call last):
  File "<stdin>", line 1, in <module>
TypeError: can only concatenate str (not "int") to str
```

Takeaways

1. All python data has a type
2. In these slides we looked at two data types: numbers and strings
3. Builtin python operations (like "+") work only on certain types
4. The result of every python operation has to have a type, and when the opearyion has arguments of different types, python has to chose a type for the result. This is called **casting**.