# 5.DataType

April 21, 2020

### 0.0.1 Data Type

[1]:
```
s = "Hello World"
```

[2]:
```
print(type(s))
```

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

immutable means we can not change it

[3]:
```
print("Before: ", s)
s = s.lower()
print("After: ", s)
```

```
Before:  Hello World
After:  hello world
```

[4]:
```
s = "Hello World"
```

[5]:
```
s = s[:5]
```

[6]:
```
print(s)
```

```
Hello
```

[7]:
```
s = "hello "
s = s + 'world'
print(s)
```

```
hello world
```

[9]:
```
s = "Hello world"
s = s[0:0]
print(s)
```

mutablility we can over-write value

im-mutablility means we can not over write value

**over-write & over-riding**

[10]:
```
s = "Hello World"
print(id(s), s)

s = s.lower()

print(id(s), s)
```

```
2295990405040 Hello World
2295990381680 hello world
```

[11]:
```
l = [ 1, 2, 3, 4]
print(id(l), l)
l.append(5)
print(id(l), l)
```

```
2295989583816 [1, 2, 3, 4]
2295989583816 [1, 2, 3, 4, 5]
```

[12]:
```
s = "Hello World"
s1 = s
print(id(s), id(s1))
print(s is s1)
print(s, s1)
```

```
2295990378800 2295990378800
True
Hello World Hello World
```

[13]:
```
s = s.lower() # --> new -string -> new object --> new id
print(id(s), id(s1))
print(s is s1)
print(s, s1)
```

```
2295990298736 2295990378800
False
hello world Hello World
```

[14]:
```
s = "Hello World"
s1 = "Hello World"
```

[15]:
```
print(id(s), id(s1))
```

```
2295990362608 2295990379440
```

[16]:
```
s = "Hello World"
```

[17]:
```
print(type(s))
```

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

[18]:
```
print(id(s))
```

```
2295990297520
```

[19]:
```
print(s)
```

```
Hello World
```

[20]:
```
s1 = s.lower()
```

[21]:
```
print(s1)
```

```
hello world
```

[22]:
```
print(s)
```

```
Hello World
```

[23]:
```
id(s)
```

[23]:
```
2295990297520
```

[24]:
```
id(s1)
```

[24]:
```
2295990406512
```

[25]:
```
s is s1
```

[25]:
```
False
```

[26]:
```
print(dir(int))
```

```
['__abs__', '__add__', '__and__', '__bool__', '__ceil__', '__class__',
'__delattr__', '__dir__', '__divmod__', '__doc__', '__eq__', '__float__',
'__floor__', '__floordiv__', '__format__', '__ge__', '__getattribute__',
'__getnewargs__', '__gt__', '__hash__', '__index__', '__init__',
'__init_subclass__', '__int__', '__invert__', '__le__', '__lshift__', '__lt__',
'__mod__', '__mul__', '__ne__', '__neg__', '__new__', '__or__', '__pos__',
'__pow__', '__radd__', '__rand__', '__rdivmod__', '__reduce__', '__reduce_ex__',
'__repr__', '__rfloordiv__', '__rlshift__', '__rmod__', '__rmul__', '__ror__',
'__round__', '__rpow__', '__rrshift__', '__rshift__', '__rsub__',
'__rtruediv__', '__rxor__', '__setattr__', '__sizeof__', '__str__', '__sub__',
'__subclasshook__', '__truediv__', '__trunc__', '__xor__', 'bit_length',
```

```
'conjugate', 'denominator', 'from_bytes', 'imag', 'numerator', 'real',
'to_bytes']
```

[27]:
```
help(int.bit_length)
```

```
Help on method_descriptor:

bit_length(self, /)
    Number of bits necessary to represent self in binary.

    >>> bin(37)
    '0b100101'
    >>> (37).bit_length()
    6
```

[32]:
```
#    32 16 8 4 2 1
#       1  0 0 0 1
x = 17 #
print(x.bit_length())
```

```
5
```

[28]:
```
x = 5 # 101
x.bit_length()
```

[28]:
```
3
```

[29]:
```
x.conjugate()
```

[29]:
```
5
```

[30]:
```
x = -5
```

[31]:
```
print(x.conjugate())
```

```
-5
```

[33]:
```
print(dir(int))
```

```
['__abs__', '__add__', '__and__', '__bool__', '__ceil__', '__class__',
'__delattr__', '__dir__', '__divmod__', '__doc__', '__eq__', '__float__',
'__floor__', '__floordiv__', '__format__', '__ge__', '__getattribute__',
'__getnewargs__', '__gt__', '__hash__', '__index__', '__init__',
'__init_subclass__', '__int__', '__invert__', '__le__', '__lshift__', '__lt__',
'__mod__', '__mul__', '__ne__', '__neg__', '__new__', '__or__', '__pos__',
'__pow__', '__radd__', '__rand__', '__rdivmod__', '__reduce__', '__reduce_ex__',
'__repr__', '__rfloordiv__', '__rlshift__', '__rmod__', '__rmul__', '__ror__',
```

```
'__round__', '__rpow__', '__rrshift__', '__rshift__', '__rsub__',
'__rtruediv__', '__rxor__', '__setattr__', '__sizeof__', '__str__', '__sub__',
'__subclasshook__', '__truediv__', '__trunc__', '__xor__', 'bit_length',
'conjugate', 'denominator', 'from_bytes', 'imag', 'numerator', 'real',
'to_bytes']
```

[34]:
```
print(dir(float))
```

```
['__abs__', '__add__', '__bool__', '__class__', '__delattr__', '__dir__',
'__divmod__', '__doc__', '__eq__', '__float__', '__floordiv__', '__format__',
'__ge__', '__getattribute__', '__getformat__', '__getnewargs__', '__gt__',
'__hash__', '__init__', '__init_subclass__', '__int__', '__le__', '__lt__',
'__mod__', '__mul__', '__ne__', '__neg__', '__new__', '__pos__', '__pow__',
'__radd__', '__rdivmod__', '__reduce__', '__reduce_ex__', '__repr__',
'__rfloordiv__', '__rmod__', '__rmul__', '__round__', '__rpow__', '__rsub__',
'__rtruediv__', '__set_format__', '__setattr__', '__sizeof__', '__str__',
'__sub__', '__subclasshook__', '__truediv__', '__trunc__', 'as_integer_ratio',
'conjugate', 'fromhex', 'hex', 'imag', 'is_integer', 'real']
```

[35]:
```
print(dir(complex))
```

```
['__abs__', '__add__', '__bool__', '__class__', '__delattr__', '__dir__',
'__divmod__', '__doc__', '__eq__', '__float__', '__floordiv__', '__format__',
'__ge__', '__getattribute__', '__getnewargs__', '__gt__', '__hash__',
'__init__', '__init_subclass__', '__int__', '__le__', '__lt__', '__mod__',
'__mul__', '__ne__', '__neg__', '__new__', '__pos__', '__pow__', '__radd__',
'__rdivmod__', '__reduce__', '__reduce_ex__', '__repr__', '__rfloordiv__',
'__rmod__', '__rmul__', '__rpow__', '__rsub__', '__rtruediv__', '__setattr__',
'__sizeof__', '__str__', '__sub__', '__subclasshook__', '__truediv__',
'conjugate', 'imag', 'real']
```

[36]:
```
print(dir(str))
```

```
['__add__', '__class__', '__contains__', '__delattr__', '__dir__', '__doc__',
'__eq__', '__format__', '__ge__', '__getattribute__', '__getitem__',
'__getnewargs__', '__gt__', '__hash__', '__init__', '__init_subclass__',
'__iter__', '__le__', '__len__', '__lt__', '__mod__', '__mul__', '__ne__',
'__new__', '__reduce__', '__reduce_ex__', '__repr__', '__rmod__', '__rmul__',
'__setattr__', '__sizeof__', '__str__', '__subclasshook__', 'capitalize',
'casefold', 'center', 'count', 'encode', 'endswith', 'expandtabs', 'find',
'format', 'format_map', 'index', 'isalnum', 'isalpha', 'isascii', 'isdecimal',
'isdigit', 'isidentifier', 'islower', 'isnumeric', 'isprintable', 'isspace',
'istitle', 'isupper', 'join', 'ljust', 'lower', 'lstrip', 'maketrans',
'partition', 'replace', 'rfind', 'rindex', 'rjust', 'rpartition', 'rsplit',
'rstrip', 'split', 'splitlines', 'startswith', 'strip', 'swapcase', 'title',
'translate', 'upper', 'zfill']
```

list, dictionary

[ ]: