Python Strings

## Strings

Strings in python are surrounded by either single quotation marks, or double quotation marks.

'hello' is the same as "hello".

You can display a string literal with the print() function:

### Example

print("Hello")  
print('Hello')

## Assign String to a Variable

Assigning a string to a variable is done with the variable name followed by an equal sign and the string:

### Example

a = "Hello"  
print(a)

## Multiline Strings

You can assign a multiline string to a variable by using three quotes:

### Example

You can use three double quotes:

a = """Lorem ipsum dolor sit amet,  
consectetur adipiscing elit,  
sed do eiusmod tempor incididunt  
ut labore et dolore magna aliqua."""  
print(a)

Or three single quotes:

### Example

a = '''Lorem ipsum dolor sit amet,  
consectetur adipiscing elit,  
sed do eiusmod tempor incididunt  
ut labore et dolore magna aliqua.'''  
print(a)

**Note:** in the result, the line breaks are inserted at the same position as in the code.

## Strings are Arrays

Like many other popular programming languages, strings in Python are arrays of bytes representing unicode characters.

However, Python does not have a character data type, a single character is simply a string with a length of 1.

Square brackets can be used to access elements of the string.

### Example

Get the character at position 1 (remember that the first character has the position 0):

a = "Hello, World!"  
print(a[1])

## Looping Through a String

Since strings are arrays, we can loop through the characters in a string, with a for loop.

### Example

Loop through the letters in the word "banana":

for x in "banana":  
  print(x)

## String Length

To get the length of a string, use the len() function.

### Example

The len() function returns the length of a string:

a = "Hello, World!"  
print(len(a))

## Check String

To check if a certain phrase or character is present in a string, we can use the keyword in.

### Example

Check if "free" is present in the following text:

txt = "The best things in life are free!"  
print("free" in txt)

Use it in an if statement:

### Example

Print only if "free" is present:

txt = "The best things in life are free!"  
if "free" in txt:  
  print("Yes, 'free' is present.")

## Check if NOT

To check if a certain phrase or character is NOT present in a string, we can use the keyword not in.

### Example

Check if "expensive" is NOT present in the following text:

txt = "The best things in life are free!"  
print("expensive" not in txt)

Use it in an if statement:

### Example

print only if "expensive" is NOT present:

txt = "The best things in life are free!"  
if "expensive" not in txt:  
  print("Yes, 'expensive' is NOT present.")

# Python - Slicing Strings

## Slicing

You can return a range of characters by using the slice syntax.

Specify the start index and the end index, separated by a colon, to return a part of the string.

### Example

Get the characters from position 2 to position 5 (not included):

b = "Hello, World!"  
print(b[2:5])

**Note:**The first character has index 0.

## Slice From the Start

By leaving out the start index, the range will start at the first character:

### Example

Get the characters from the start to position 5 (not included):

b = "Hello, World!"  
print(b[:5])

## Slice To the End

By leaving out the end index, the range will go to the end:

### Example

Get the characters from position 2, and all the way to the end:

b = "Hello, World!"  
print(b[2:])

## Negative Indexing

Use negative indexes to start the slice from the end of the string:

### Example

Get the characters:

From: "o" in "World!" (position -5)

To, but not included: "d" in "World!" (position -2):

b = "Hello, World!"  
print(b[-5:-2])

# Python - Modify Strings

Python has a set of built-in methods that you can use on strings.

## Upper Case

### Example

The upper() method returns the string in upper case:

a = "Hello, World!"  
print(a.upper())

## Lower Case

### Example

The lower() method returns the string in lower case:

a = "Hello, World!"  
print(a.lower())

## Remove Whitespace

Whitespace is the space before and/or after the actual text, and very often you want to remove this space.

### Example

The strip() method removes any whitespace from the beginning or the end:

a = " Hello, World! "  
print(a.strip()) # returns "Hello, World!"

## Replace String

### Example

The replace() method replaces a string with another string:

a = "Hello, World!"  
print(a.replace("H", "J"))

## Split String

The split() method returns a list where the text between the specified separator becomes the list items.

### Example

The split() method splits the string into substrings if it finds instances of the separator:

a = "Hello, World!"  
print(a.split(",")) # returns ['Hello', ' World!']

# Python - String Concatenation

## String Concatenation

To concatenate, or combine, two strings you can use the + operator.

### Example

Merge variable a with variable b into variable c:

a = "Hello"  
b = "World"  
c = a + b  
print(c)

### Example

To add a space between them, add a " ":

a = "Hello"  
b = "World"  
c = a + " " + b  
print(c)

# Python - Format - Strings

## String Format

As we learned in the Python Variables chapter, we cannot combine strings and numbers like this:

### Example

age = 36  
txt = "My name is John, I am " + age  
print(txt)

But we can combine strings and numbers by using the format() method!

The format() method takes the passed arguments, formats them, and places them in the string where the placeholders {} are:

### Example

Use the format() method to insert numbers into strings:

age = 36  
txt = "My name is John, and I am {}"  
print(txt.format(age))

The format() method takes unlimited number of arguments, and are placed into the respective placeholders:

### Example

quantity = 3  
itemno = 567  
price = 49.95  
myorder = "I want {} pieces of item {} for {} dollars."  
print(myorder.format(quantity, itemno, price))

You can use index numbers {0} to be sure the arguments are placed in the correct placeholders:

### Example

quantity = 3  
itemno = 567  
price = 49.95  
myorder = "I want to pay {2} dollars for {0} pieces of item {1}."  
print(myorder.format(quantity, itemno, price))

# Python - Escape Characters

## Escape Character

To insert characters that are illegal in a string, use an escape character.

An escape character is a backslash \ followed by the character you want to insert.

An example of an illegal character is a double quote inside a string that is surrounded by double quotes:

### Example

You will get an error if you use double quotes inside a string that is surrounded by double quotes:

txt = "We are the so-called "Vikings" from the north."

To fix this problem, use the escape character \":

### Example

The escape character allows you to use double quotes when you normally would not be allowed:

txt = "We are the so-called \"Vikings\" from the north."

## Escape Characters

Other escape characters used in Python:

|  |  |
| --- | --- |
| **Code** | **Result** |
| \' | Single Quote |
| \\ | Backslash |
| \n | New Line |
| \r | Carriage Return |
| \t | Tab |
| \b | Backspace |
| \f | Form Feed |
| \ooo | Octal value |
| \xhh | Hex value |

# Python - String Methods

## String Methods

Python has a set of built-in methods that you can use on strings.

**Note:** All string methods returns new values. They do not change the original string.

|  |  |
| --- | --- |
| **Method** | **Description** |
| [capitalize()](https://www.w3schools.com/python/ref_string_capitalize.asp) | Converts the first character to upper case |
| [casefold()](https://www.w3schools.com/python/ref_string_casefold.asp) | Converts string into lower case |
| [center()](https://www.w3schools.com/python/ref_string_center.asp) | Returns a centered string |
| [count()](https://www.w3schools.com/python/ref_string_count.asp) | Returns the number of times a specified value occurs in a string |
| [encode()](https://www.w3schools.com/python/ref_string_encode.asp) | Returns an encoded version of the string |
| [endswith()](https://www.w3schools.com/python/ref_string_endswith.asp) | Returns true if the string ends with the specified value |
| [expandtabs()](https://www.w3schools.com/python/ref_string_expandtabs.asp) | Sets the tab size of the string |
| [find()](https://www.w3schools.com/python/ref_string_find.asp) | Searches the string for a specified value and returns the position of where it was found |
| [format()](https://www.w3schools.com/python/ref_string_format.asp) | Formats specified values in a string |
| format\_map() | Formats specified values in a string |
| [index()](https://www.w3schools.com/python/ref_string_index.asp) | Searches the string for a specified value and returns the position of where it was found |
| [isalnum()](https://www.w3schools.com/python/ref_string_isalnum.asp) | Returns True if all characters in the string are alphanumeric |
| [isalpha()](https://www.w3schools.com/python/ref_string_isalpha.asp) | Returns True if all characters in the string are in the alphabet |
| [isdecimal()](https://www.w3schools.com/python/ref_string_isdecimal.asp) | Returns True if all characters in the string are decimals |
| [isdigit()](https://www.w3schools.com/python/ref_string_isdigit.asp) | Returns True if all characters in the string are digits |
| [isidentifier()](https://www.w3schools.com/python/ref_string_isidentifier.asp) | Returns True if the string is an identifier |
| [islower()](https://www.w3schools.com/python/ref_string_islower.asp) | Returns True if all characters in the string are lower case |
| [isnumeric()](https://www.w3schools.com/python/ref_string_isnumeric.asp) | Returns True if all characters in the string are numeric |
| [isprintable()](https://www.w3schools.com/python/ref_string_isprintable.asp) | Returns True if all characters in the string are printable |
| [isspace()](https://www.w3schools.com/python/ref_string_isspace.asp) | Returns True if all characters in the string are whitespaces |
| [istitle()](https://www.w3schools.com/python/ref_string_istitle.asp) | Returns True if the string follows the rules of a title |
| [isupper()](https://www.w3schools.com/python/ref_string_isupper.asp) | Returns True if all characters in the string are upper case |
| [join()](https://www.w3schools.com/python/ref_string_join.asp) | Joins the elements of an iterable to the end of the string |
| [ljust()](https://www.w3schools.com/python/ref_string_ljust.asp) | Returns a left justified version of the string |
| [lower()](https://www.w3schools.com/python/ref_string_lower.asp) | Converts a string into lower case |
| [lstrip()](https://www.w3schools.com/python/ref_string_lstrip.asp) | Returns a left trim version of the string |
| [maketrans()](https://www.w3schools.com/python/ref_string_maketrans.asp) | Returns a translation table to be used in translations |
| [partition()](https://www.w3schools.com/python/ref_string_partition.asp) | Returns a tuple where the string is parted into three parts |
| [replace()](https://www.w3schools.com/python/ref_string_replace.asp) | Returns a string where a specified value is replaced with a specified value |
| [rfind()](https://www.w3schools.com/python/ref_string_rfind.asp) | Searches the string for a specified value and returns the last position of where it was found |
| [rindex()](https://www.w3schools.com/python/ref_string_rindex.asp) | Searches the string for a specified value and returns the last position of where it was found |
| [rjust()](https://www.w3schools.com/python/ref_string_rjust.asp) | Returns a right justified version of the string |
| [rpartition()](https://www.w3schools.com/python/ref_string_rpartition.asp) | Returns a tuple where the string is parted into three parts |
| [rsplit()](https://www.w3schools.com/python/ref_string_rsplit.asp) | Splits the string at the specified separator, and returns a list |
| [rstrip()](https://www.w3schools.com/python/ref_string_rstrip.asp) | Returns a right trim version of the string |
| [split()](https://www.w3schools.com/python/ref_string_split.asp) | Splits the string at the specified separator, and returns a list |
| [splitlines()](https://www.w3schools.com/python/ref_string_splitlines.asp) | Splits the string at line breaks and returns a list |
| [startswith()](https://www.w3schools.com/python/ref_string_startswith.asp) | Returns true if the string starts with the specified value |
| [strip()](https://www.w3schools.com/python/ref_string_strip.asp) | Returns a trimmed version of the string |
| [swapcase()](https://www.w3schools.com/python/ref_string_swapcase.asp) | Swaps cases, lower case becomes upper case and vice versa |
| [title()](https://www.w3schools.com/python/ref_string_title.asp) | Converts the first character of each word to upper case |
| [translate()](https://www.w3schools.com/python/ref_string_translate.asp) | Returns a translated string |
| [upper()](https://www.w3schools.com/python/ref_string_upper.asp) | Converts a string into upper case |
| [zfill()](https://www.w3schools.com/python/ref_string_zfill.asp) | Fills the string with a specified number of 0 values at the beginning |

# Python Booleans

Booleans represent one of two values: True or False.

## Boolean Values

In programming you often need to know if an expression is True or False.

You can evaluate any expression in Python, and get one of two answers, True or False.

When you compare two values, the expression is evaluated and Python returns the Boolean answer:

### Example

print(10 > 9)  
print(10 == 9)  
print(10 < 9)

## Evaluate Values and Variables

The bool() function allows you to evaluate any value, and give you True or False in return,

### Example

Evaluate a string and a number:

print(bool("Hello"))  
print(bool(15))

### Example

Evaluate two variables:

x = "Hello"  
y = 15  
  
print(bool(x))  
print(bool(y))

# Python Operators

Python divides the operators in the following groups:

* Arithmetic operators
* Assignment operators
* Comparison operators
* Logical operators
* Identity operators
* Membership operators
* Bitwise operators

## Python Arithmetic Operators

Arithmetic operators are used with numeric values to perform common mathematical operations:

|  |  |  |
| --- | --- | --- |
| **Operator** | **Name** | **Example** |
| + | Addition | x + y |
| - | Subtraction | x - y |
| \* | Multiplication | x \* y |
| / | Division | x / y |
| % | Modulus | x % y |
| \*\* | Exponentiation | x \*\* y |
| // | Floor division | x // y |

## Python Assignment Operators

Assignment operators are used to assign values to variables:

|  |  |  |
| --- | --- | --- |
| **Operator** | **Example** | **Same As** |
| = | x = 5 | x = 5 |
| += | x += 3 | x = x + 3 |
| -= | x -= 3 | x = x - 3 |
| \*= | x \*= 3 | x = x \* 3 |
| /= | x /= 3 | x = x / 3 |
| %= | x %= 3 | x = x % 3 |
| //= | x //= 3 | x = x // 3 |
| \*\*= | x \*\*= 3 | x = x \*\* 3 |
| &= | x &= 3 | x = x & 3 |
| |= | x |= 3 | x = x | 3 |
| ^= | x ^= 3 | x = x ^ 3 |
| >>= | x >>= 3 | x = x >> 3 |
| <<= | x <<= 3 | x = x << 3 |

## Python Comparison Operators

Comparison operators are used to compare two values:

|  |  |  |
| --- | --- | --- |
| **Operator** | **Name** | **Example** |
| == | Equal | x == y |
| != | Not equal | x != y |
| > | Greater than | x > y |
| < | Less than | x < y |
| >= | Greater than or equal to | x >= y |
| <= | Less than or equal to | x <= y |

## Python Logical Operators

Logical operators are used to combine conditional statements:

|  |  |  |
| --- | --- | --- |
| **Operator** | **Description** | **Example** |
| and | Returns True if both statements are true | x < 5 and  x < 10 |
| or | Returns True if one of the statements is true | x < 5 or x < 4 |
| not | Reverse the result, returns False if the result is true | not(x < 5 and x < 10) |

## Python Identity Operators

Identity operators are used to compare the objects, not if they are equal, but if they are actually the same object, with the same memory location:

|  |  |  |
| --- | --- | --- |
| **Operator** | **Description** | **Example** |
| is | Returns True if both variables are the same object | x is y |
| is not | Returns True if both variables are not the same object | x is not y |

## Python Membership Operators

Membership operators are used to test if a sequence is presented in an object:

|  |  |  |
| --- | --- | --- |
| **Operator** | **Description** | **Example** |
| in | Returns True if a sequence with the specified value is present in the object | x in y |
| not in | Returns True if a sequence with the specified value is not present in the object | x not in y |

## Python Bitwise Operators

Bitwise operators are used to compare (binary) numbers:

|  |  |  |
| --- | --- | --- |
| **Operator** | **Name** | **Description** |
| & | AND | Sets each bit to 1 if both bits are 1 |
| | | OR | Sets each bit to 1 if one of two bits is 1 |
| ^ | XOR | Sets each bit to 1 if only one of two bits is 1 |
| ~ | NOT | Inverts all the bits |
| << | Zero fill left shift | Shift left by pushing zeros in from the right and let the leftmost bits fall off |
| >> | Signed right shift | Shift right by pushing copies of the leftmost bit in from the left, and let the rightmost bits fall off |

# Python User Input

## User Input

Python allows for user input.

That means we are able to ask the user for input.

The method is a bit different in Python 3.6 than Python 2.7.

Python 3.6 uses the input() method.

Python 2.7 uses the raw\_input() method.

The following example asks for the username, and when you entered the username, it gets printed on the screen:

### Python 3.6

username = input("Enter username:")  
print("Username is: " + username)