

# **Python from Scratch**

## **Python Strings**

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# 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("No, '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
<code>\'</code>	Single Quote
<code>\\</code>	Backslash
<code>\n</code>	New Line
<code>\r</code>	Carriage Return
<code>\t</code>	Tab
<code>\b</code>	Backspace
<code>\f</code>	Form Feed
<code>\ooo</code>	Octal value
<code>\xhh</code>	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 return new values. They do not change the original string.

Method	Description
<b>capitalize()</b>	Converts the first character to upper case
<b>casefold()</b>	Converts string into lower case
<b>center()</b>	Returns a centered string
<b>count()</b>	Returns the number of times a specified value occurs in a string
<b>encode()</b>	Returns an encoded version of the string
<b>endswith()</b>	Returns true if the string ends with the specified value
<b>expandtabs()</b>	Sets the tab size of the string
<b>find()</b>	Searches the string for a specified value and returns the position of where it was found
<b>format()</b>	Formats specified values in a string
<b>format_map()</b>	Formats specified values in a string
<b>index()</b>	Searches the string for a specified value and returns the position of where it was found
<b>isalnum()</b>	Returns True if all characters in the string are alphanumeric
<b>isalpha()</b>	Returns True if all characters in the string are in the alphabet
<b>isdecimal()</b>	Returns True if all characters in the string are decimals
<b>isdigit()</b>	Returns True if all characters in the string are digits



<b>isidentifier()</b>	Returns True if the string is an identifier
<b>islower()</b>	Returns True if all characters in the string are lower case
<b>isnumeric()</b>	Returns True if all characters in the string are numeric
<b>isprintable()</b>	Returns True if all characters in the string are printable
<b>isspace()</b>	Returns True if all characters in the string are whitespaces
<b>istitle()</b>	Returns True if the string follows the rules of a title
<b>isupper()</b>	Returns True if all characters in the string are upper case
<b>join()</b>	Joins the elements of an iterable to the end of the string
<b>ljust()</b>	Returns a left justified version of the string
<b>lower()</b>	Converts a string into lower case
<b>lstrip()</b>	Returns a left trim version of the string
<b>maketrans()</b>	Returns a translation table to be used in translations
<b>partition()</b>	Returns a tuple where the string is parted into three parts
<b>replace()</b>	Returns a string where a specified value is replaced with a specified value
<b>rfind()</b>	Searches the string for a specified value and returns the last position of where it was found
<b>rindex()</b>	Searches the string for a specified value and returns the last position of where it was found
<b>rjust()</b>	Returns a right justified version of the string
<b>rpartition()</b>	Returns a tuple where the string is parted into three parts
<b>rsplit()</b>	Splits the string at the specified separator, and returns a list
<b>rstrip()</b>	Returns a right trim version of the string
<b>split()</b>	Splits the string at the specified separator, and returns a list

<b>splitlines()</b>	Splits the string at line breaks and returns a list
<b>startswith()</b>	Returns true if the string starts with the specified value
<b>strip()</b>	Returns a trimmed version of the string
<b>swapcase()</b>	Swaps cases, lower case becomes upper case and vice versa
<b>title()</b>	Converts the first character of each word to upper case
<b>translate()</b>	Returns a translated string
<b>upper()</b>	Converts a string into upper case
<b>zfill()</b>	Fills the string with a specified number of 0 values at the beginning

## Python - String Exercises

### Test Yourself With Exercises

Now you have learned a lot about Strings, and how to use them in Python.

Are you ready for a test?

Try to insert the missing part to make the code work as expected:

#### Exercise:

Use the **len** method to print the length of the string.

```
x = "Hello World"  
print()
```