

Working with strings

INTRODUCTION TO PYTHON FOR DEVELOPERS



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Strings are everywhere!

- User profiles
- Search engines
- Large language models



¹ https://unsplash.com/@steve_j

Python knows single and double quotes

This works

```
my_text = 'Hello, my name is George.'
```

This also works

```
my_text = "Hello, my name is George."
```

- ' = apostrophe = single quote

Advantages of double quotes

```
# Single quote string variable containing an apostrophe  
my_text = 'Hello, my name's George.'
```

SyntaxError: invalid syntax.

```
# Double quote string variable containing an apostrophe  
my_text = "Hello, my name's George."  
print(my_text)
```

Hello, my name's George.

Methods

- Method = a function that is only available to a specific data type
- `str` methods

```
# Calling a string method  
str_variable.method()
```

Replacing parts of strings

- `.replace(text_to_be_replaced, text_to_change_it_to)`

```
my_text = "Hello, my name's George."
```

```
# Replace George with John
my_text = my_text.replace("George", "John")
print(my_text)
```

```
Hello, my name's John.
```

- Common use cases
 - Reformatting e.g., change spaces to underscores
 - Fixing or removing typos

Changing case

```
current_top_album = "For All The Dogs"
```

```
# Convert to lowercase  
current_top_album = current_top_album.lower()  
print(current_top_album)
```

```
for all the dogs
```

```
# Change to uppercase  
current_top_album = current_top_album.upper()  
print(current_top_album)
```

```
FOR ALL THE DOGS
```

Sentences and paragraphs

```
nineteen_eightyfour = "It was a bright cold day in April, and the clocks were striking thirteen."
```



Multi-line strings

```
# Create a string variable over multiple lines
harry_potter = """Mr. and Mrs. Dursley,
of number four Privet Drive,
were proud to say that they were perfectly normal,
thank you very much.
"""


```

- `"""text"""` : Multi-line strings
 - Enhance readability
 - Avoid the need to use special characters
 - Longer text such as customer reviews
 - Used to describe what functions do

String cheat sheet

Syntax	Purpose	Example
Single quotes ':'	String variable	my_string = 'My string'
Double quotes ""	String variable	my_string = "My string"
Triple quotes """	Multi-line string variable	my_string = """My string"""
str.replace()	Replacing parts of strings	my_string = my_string.replace("text_to_remove", "text_to_change_to")
str.lower()	Lowercase string	my_string = my_string.lower()
str.upper()	Uppercase string	my_string = my_string.upper()

¹ <https://docs.python.org/3/library/stdtypes.html#string-methods>

Let's practice!

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Lists

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Problem

```
# Variables of product prices  
price_one = 10  
price_two = 20  
price_three = 30  
price_four = 15  
price_five = 25  
price_six = 35
```

Lists to the rescue!

- List = store multiple values in a single variable
 - Can contain any combination of data types e.g., str , float , int , bool

```
# List of prices  
prices = [10, 20, 30, 15, 25, 35]
```

```
# List of prices using variables as values  
prices = [price_one, price_two, price_three,  
          price_four, price_five, price_six]
```

Checking the data type

```
# Check the data type of a list  
type(prices)
```

```
<class 'list'>
```

```
# Check the data type of a string  
type("Hello")
```

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

Accessing elements of a list

```
# Print all values in the list variable  
print(prices)
```

```
[10, 20, 30, 15, 25, 35]
```

- Lists are ordered
 - Can use subsetting or indexing
 - Python counts values starting from **zero** for the *first element*

Accessing elements of a list

- List = []
- Subsetting = a_list[index]

```
prices = [10, 20, 30, 15, 25, 35]
```

```
# Get the value at the first index  
prices[0]
```

10

```
# Get the value at the fourth index  
prices[3]
```

15

Finding the last element in a list

```
prices = [10, 20, 30, 15, 25, 35]
```

```
# Get the last element of a list  
prices[5]
```

35

```
# Get the last element of a list  
prices[-1]
```

35

Accessing multiple elements

```
prices = [10, 20, 30, 15, 25, 35]
```

```
# Access the second and third elements  
prices[1:3]
```

```
[20, 30]
```

- [starting_element:last_element + 1]
- Add one to the last element's index because:
 - Python returns everything up to **but not including** that index

Accessing multiple elements

```
# Access all elements from the fourth index onwards  
prices[3:]
```

```
[15, 25, 35]
```

```
# Get the first three elements  
prices[:3]
```

```
[10, 20, 30]
```

Alternating access

```
# Access every other element  
prices[::2]
```

```
[10, 30, 25]
```

```
# Access every third element, starting at the second  
prices[1::3]
```

```
[20, 25]
```

Lists cheat sheet

Syntax	Functionality
<code>a_list = [1, 2, 3, 4, 5, 6]</code>	Create a list variable
<code>a_list[0]</code>	Get the first element at index zero
<code>a_list[-1]</code>	Get the last element
<code>a_list[0:3]</code>	Get the first, second, and third elements
<code>a_list[:3]</code>	Get the first, second, and third elements
<code>a_list[2:]</code>	Get all elements from the third index onwards
<code>a_list[::-2]</code>	Get every other element from the first index onwards

Let's practice!

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Dictionaries

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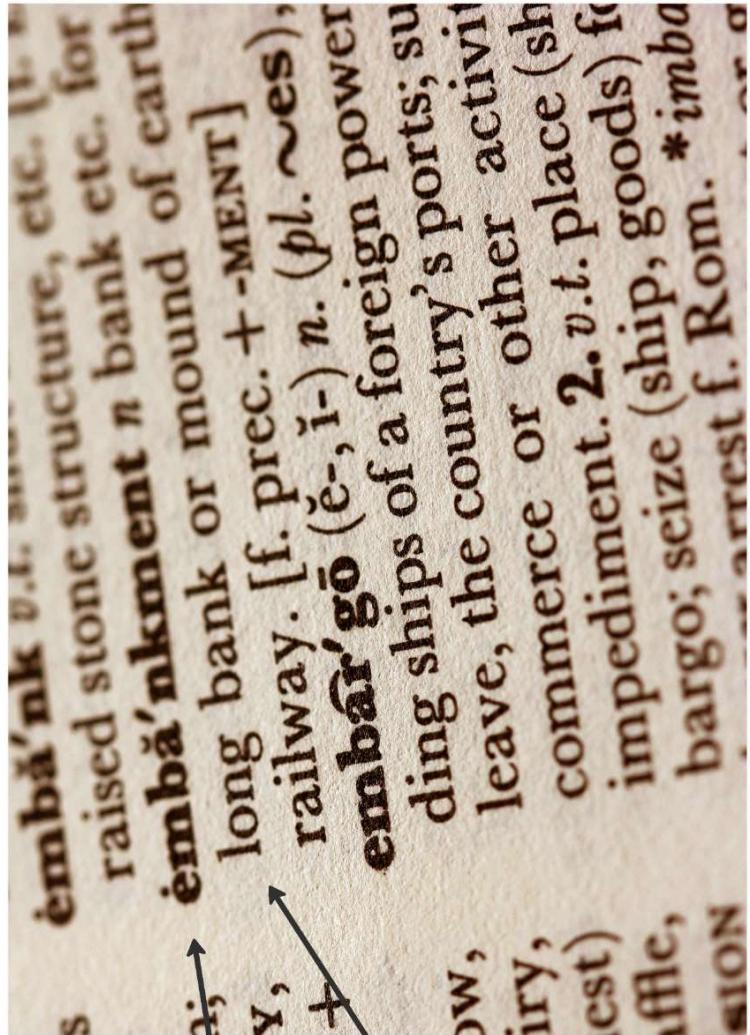
Products list

```
prices = [10, 20, 30, 15, 25, 35]

# Product IDs
product_ids = ["AG32", "HT91", "PL65", "OS31", "KB07", "TR48"]
```

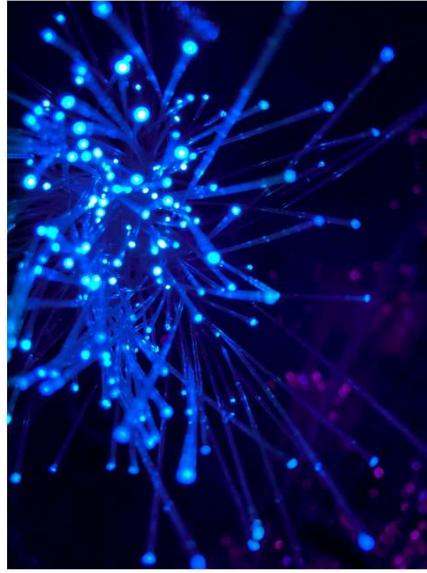
Dictionary

- Dictionary = key-value pairs



Why use dictionaries?

- user_id
- order_number
- date
- value
- payment_method
- ip_address
- location



¹ <https://unsplash.com/@sharonmccutcheon; https://unsplash.com/@jijing>

Creating a dictionary

```
# Creating a dictionary  
products_dict =
```

Creating a dictionary

```
# Creating a dictionary  
products_dict = {
```

Creating a dictionary

```
# Creating a dictionary  
products_dict = {"AG32"
```



Creating a dictionary

```
# Creating a dictionary  
products_dict = {"AG32":
```

Creating a dictionary

```
# Creating a dictionary  
products_dict = {"AG32": 10}
```



Creating a dictionary

```
# Creating a dictionary  
products_dict = {"AG32": 10,
```



Creating a dictionary

```
# Creating a dictionary  
products_dict = {"AG32": 10, "HT91": 20,
```



Creating a dictionary

```
# Creating a dictionary
products_dict = {"AG32": 10, "HT91": 20,
                 "PL65": 30, "OS31": 15,
                 "KB07": 25, "TR48": 35}
```

Creating a dictionary

```
# Creating a dictionary
products_dict = {"AG32": 10, "HT91": 20,
                 "PL65": 30, "OS31": 15,
                 "KB07": 25, "TR48": 35}
```

Accessing a value based on the key

- Dictionaries are ordered
 - Allows values to be accessed by subsetting on the key
- What is the price of product ID "AG32" ?

```
# Find the product's price  
products_dict["AG32"]
```

1.0



Accessing all values

```
# Get all values from a dictionary  
products_dict.values()
```

```
dict_values([10, 20, 30, 15, 25, 35])
```

Accessing all keys

```
# Retrieve all keys in a dictionary  
products_dict.keys()
```

```
dict_keys(['AG32', 'HT91', 'PL65', 'OS31', 'KB07', 'TR48'])
```

Viewing an entire dictionary

```
# Print the dictionary  
print(products_dict)
```

```
{'AG32': 10, 'HT91': 20, 'PL65': 30, 'OS31': 15, 'KB07': 25, 'TR48': 35}
```

```
# Get all items (key-value pairs)  
products_dict.items()
```

```
dict_items([( 'AG32' , 10), ('HT91' , 20), ('PL65' , 30), ('OS31' , 15), ('KB07' , 25),  
( 'TR48' , 35)])
```

- .items() is useful when iterating or looping

Adding a key-value pair

```
# Add a new key-value pair  
products_dict["UI56"] = 40
```



Updating a value

```
# Updating a value associated with an existing key  
products_dict["HT91"] = 12
```

Duplicate keys

```
# Creating a dictionary with a duplicate key
products_dict = {"AG32": 10, "AG32": 20,
                 "PL65": 30, "OS31": 15,
                 "KB07": 25, "TR48": 35}

# Print the duplicate key's value
print(products_dict["AG32"])
```

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Sets and tuples

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Sets

- Contain **unique** data
- Unchangeable*
 - Can add or remove values, but *cannot change them*
- Ideal to identify and remove duplicates
- Quick to search (compared to other data structures such as lists)

Creating a set

- Set = `{}`
- `:` = Dictionary
- No `:` = Set

```
# Create an attendee set
attendees_set = {"John Smith", "Alan Jones", "Roger Thompson",
                  "John Smith", "Brandon Sharp", "Sam Washington"}

print(attendees_set)
```

```
{'Alan Jones', 'Brandon Sharp', 'John Smith',
 'Roger Thompson', 'Sam Washington'}
```

Converting to a set

```
# Existing list variable  
attendees_list = ["John Smith", "Alan Jones", "Roger Thompson",  
"John Smith", "Brandon Sharp", "Sam Washington"]  
  
# Convert to a set  
attendees_set = set(attendees_list)  
  
# Check the data type  
type(attendees_set)
```

set



Converting to a set

```
print(attendees_set)
```

```
{'Sam Washington', 'Roger Thompson', 'Alan Jones', 'John Smith', 'Brandon Sharp'}
```

Limitations of sets

- Don't have an index
 - Can't have duplicates
 - Can't subset with `[]`

```
# Trying to subset a set
attendees_set[0]
```

```
TypeError: 'set' object is not subscriptable
```



Sorting a set

```
attendees_set = {"John Smith", "Alan Jones", "Roger Thompson",
                  "John Smith", "Brandon Sharp", "Sam Washington"}  
  
# Sorting a set  
sorted(attendees_set)
```

```
['Alan Jones', 'Brandon Sharp', 'John Smith', 'Roger Thompson', 'Sam Washington']
```

- `sorted()` returns a list

Tuples

- **Immutable** - *cannot be changed*
 - No adding values
 - No removing values
 - No changing values
- **Ordered**
 - Can subset by index i.e., `[0]`



¹ <https://unsplash.com/@towfiqu999999>

Creating a tuple

```
# Creating a tuple
office_locations = ("New York City", "London", "Leuven")

# Convert another data structure to a tuple
attendees = tuple(attendees_list)
```



Accessing tuples

```
# Access the second element  
office_locations[1]
```

```
"London"
```

Data structures summary

Data structure	Syntax	Immutable	Allow duplicate values	Ordered	Subset with []
List	[1, 2, 3]	No	Yes	Yes	Yes - index
Dictionary	{key:value}	No	Yes	Yes	Yes - key
Set	{1, 2, 3}	No	No	No	No
Tuple	(1, 2, 3)	Yes	Yes	Yes	Yes - index

Let's practice!

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