



Dictionaries in Python

Estimated time needed: 25 minutes

Objectives

After completing this lab you will be able to:

- Work with and perform operations on dictionaries in Python

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Dictionaries

What are Dictionaries?

A dictionary consists of keys and values. It is helpful to compare a dictionary to a list. Instead of being indexed numerically like a list, dictionaries have keys. These keys are the keys that are used to access values within a dictionary.

List

Index	
0	Element 1
1	Element 2
2	Element 3
3	Element 4
.....
Element	

Dictionary

Key: is a index by label	
Key 1	Value 1
Key 1	Value 2
Key 2	Value 3
Key 3	Value 4
.....
Element/Values	

An example of a Dictionary Dict :

```
In [1]: # Create the dictionary

Dict = {"key1": 1, "key2": "2", "key3": [3, 3, 3], "key4": (4, 4, 4), ('key5'): 5, (0, 1): 6}
Dict

Out[1]: {'key1': 1,
'key2': '2',
'key3': [3, 3, 3],
'key4': (4, 4, 4),
'key5': 5,
(0, 1): 6}
```

The keys can be strings:

```
In [2]: # Access to the value by the key

Dict["key1"]

Out[2]: 1
```

Keys can also be any immutable object such as a tuple:

```
In [3]: # Access to the value by the key

Dict[(0, 1)]

Out[3]: 6
```

Each key is separated from its value by a colon ":". Commas separate the items, and the whole dictionary is enclosed in curly braces. An empty dictionary without any items is written with just two curly braces, like this "{}".

```
In [4]: # Create a sample dictionary

release_year_dict = {"Thriller": "1982", "Back in Black": "1980", \
"The Dark Side of the Moon": "1973", "The Bodyguard": "1992", \
"Bat Out of Hell": "1977", "Their Greatest Hits (1971-1975)": "1976", \
"Saturday Night Fever": "1977", "Rumours": "1977"}

release_year_dict

Out[4]: {'Thriller': '1982',
'Back in Black': '1980',
'The Dark Side of the Moon': '1973',
'The Bodyguard': '1992',
'Bat Out of Hell': '1977',
'Their Greatest Hits (1971-1975)': '1976',
'Saturday Night Fever': '1977',
'Rumours': '1977'}
```

In summary, like a list, a dictionary holds a sequence of elements. Each element is represented by a key and its corresponding value. Dictionaries are created with two curly braces containing keys and values separated by a colon. For every key, there can only be one single value, however, multiple keys can hold the same value. Keys can only be strings, numbers, or tuples, but values can be any data type.

It is helpful to visualize the dictionary as a table, as in the following image. The first column represents the keys, the second column represents the values.

Key

Key	
"Thriller"	"1982"
"Back in Black	"1980"
"The Dark Side of the Moon"	"1973"
"The Bodyguard"	"1992"
"Bat Out of Hell"	"1977"
"Their Greatest..."	"1976"
Saturday Night Fever	"1977"
"Rumours"	"1977"
Value	

Keys

You can retrieve the values based on the names:

```
In [5]: # Get value by keys

release_year_dict['Thriller']

Out[5]: '1982'
```

This corresponds to:

"Thriller"	"1982"
"Back in Black	"1980"
"The Dark Side of the Moon"	"1973"
"The Bodyguard"	"1992"
"Bat Out of Hell"	"1977"
"Their Greatest..."	"1976"
"Saturday Night Fever"	"1977"
"Rumours"	"1977"

Similarly for The Bodyguard

```
In [6]: # Get value by key

release_year_dict['The Bodyguard']

Out[6]: '1992'
```

"Thriller"	"1982"
"Back in Black	"1980"
"The Dark Side of the Moon"	"1973"
"The Bodyguard"	"1992"
"Bat Out of Hell"	"1977"
"Their Greatest..."	"1976"
"Saturday Night Fever"	"1977"
"Rumours"	"1977"

Now let us retrieve the keys of the dictionary using the method keys():

```
In [7]: # Get all the keys in dictionary

release_year_dict.keys()

Out[7]: dict_keys(['Thriller', 'Back in Black', 'The Dark Side of the Moon', 'The Bodyguard', 'Bat Out of Hell', 'Their Greatest Hits (1971-1975)', 'Saturday Night Fever', 'Rumours'])
```

You can retrieve the values using the method values():

```
In [8]: # Get all the values in dictionary

release_year_dict.values()

Out[8]: dict_values(['1982', '1980', '1973', '1992', '1977', '1976', '1977', '1977'])
```

We can add an entry:

```
In [9]: # Append value with key into dictionary

release_year_dict['Graduation'] = '2007'
release_year_dict

Out[9]: {'Thriller': '1982',
'Back in Black': '1980',
'The Dark Side of the Moon': '1973',
'The Bodyguard': '1992',
'Bat Out of Hell': '1977',
'Their Greatest Hits (1971-1975)': '1976',
'Saturday Night Fever': '1977',
'Rumours': '1977',
'Graduation': '2007'}
```

We can delete an entry:

```
In [10]: # Delete entries by key

del(release_year_dict['Thriller'])
del(release_year_dict['Graduation'])
release_year_dict

Out[10]: {'Back in Black': '1980',
'The Dark Side of the Moon': '1973',
'The Bodyguard': '1992',
'Bat Out of Hell': '1977',
'Their Greatest Hits (1971-1975)': '1976',
'Saturday Night Fever': '1977',
'Rumours': '1977'}
```

We can verify if an element is in the dictionary:

```
In [11]: # Verify the key is in the dictionary

'The Bodyguard' in release_year_dict

Out[11]: True
```

Quiz on Dictionaries

You will need this dictionary for the next two questions:

```
In [12]: # Question sample dictionary

soundtrack_dic = {"The Bodyguard": "1992", "Saturday Night Fever": "1977"}
soundtrack_dic

Out[12]: {'The Bodyguard': '1992', 'Saturday Night Fever': '1977'}
```

a) In the dictionary soundtrack_dic what are the keys ?

```
In [13]: # Write your code below and press Shift+Enter to execute

soundtrack_dic.keys()

Out[13]: dict_keys(['The Bodyguard', 'Saturday Night Fever'])
```

► Click here for the solution

b) In the dictionary soundtrack_dic what are the values ?

```
In [14]: # Write your code below and press Shift+Enter to execute

soundtrack_dic.values()

Out[14]: dict_values(['1992', '1977'])
```

► Click here for the solution

You will need this dictionary for the following questions:

The Albums Back in Black, The Bodyguard and Thriller have the following music recording sales in millions 50, 50 and 65 respectively:

a) Create a dictionary album_sales_dict where the keys are the album name and the sales in millions are the values.

```
In [17]: # Write your code below and press Shift+Enter to execute

album_sales_dict = {"Back in Black": 50, "The Bodyguard": 50, "Thriller": 65}
album_sales_dict

Out[17]: {'Back in Black': 50, 'The Bodyguard': 50, 'Thriller': 65}
```

► Click here for the solution

b) Use the dictionary to find the total sales of Thriller:

```
In [18]: # Write your code below and press Shift+Enter to execute

album_sales_dict["Thriller"]

Out[18]: 65
```

► Click here for the solution

c) Find the names of the albums from the dictionary using the method keys():

```
In [19]: # Write your code below and press Shift+Enter to execute

album_sales_dict.keys()

Out[19]: dict_keys(['Back in Black', 'The Bodyguard', 'Thriller'])
```

► Click here for the solution

d) Find the values of the recording sales from the dictionary using the method values():

```
In [20]: # Write your code below and press Shift+Enter to execute

album_sales_dict.values()

Out[20]: dict_values([50, 50, 65])
```

► Click here for the solution

The last exercise!

Congratulations, you have completed your first lesson and hands-on lab in Python.

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Change Log

Date (YYYY-MM-DD)	Version	Changed By	Change Description
2022-01-10	2.2	Malika Singla	Removed the readme for GitHub
2020-09-09	2.1	Malika Singla	Updated the variable soundtrack_dic to soundtrack_dic in Questions
2020-08-26	2.0	Lavanya	Moved lab to course repo in GitHub