

# Introduction to Python II: Lists and Dictionaries

## What we did last class:

```
In [1]: # Get ticker symbol file from SEC:

import requests

symbols = requests.get('https://www.sec.gov/files/company_tickers.json')
        .text
```

What type is "symbols"?

```
In [2]: type(symbols)
```

```
Out[2]: str
```

Show first 200 characters:

```
In [3]: symbols[:200]
```

```
Out[3]: '{"0":{"cik_str":320193,"ticker":"AAPL","title":"Apple Inc."},"1":{"cik_str":789019,"ticker":"MSFT","title":"MICROSOFT CORP"},"2":{"cik_str":1018724,"ticker":"AMZN","title":"AMAZON COM INC"},"3":{"cik_'
```

Our search function:

```
In [4]: def find_firm(name):
        i = symbols.lower().find(name)
        first = symbols[:i].rfind('{')
        last = i + symbols[i:].find('}')
        return symbols[first:last+1]
```

Find Uber:

```
In [5]: find_firm('uber')
```

```
Out[5]: '{"cik_str":1543151,"ticker":"UBER","title":"Uber Technologies, Inc"}'
```

## Python lists

This is a list:

```
In [6]: x = ['a', 'b', 'c', 'd']  
x
```

```
Out[6]: ['a', 'b', 'c', 'd']
```

What type is this?

```
In [7]: type(x)
```

```
Out[7]: list
```

Access elements of list exactly like strings:

```
In [8]: x[0]    # First elemnt
```

```
Out[8]: 'a'
```

```
In [9]: x[1:4]  # Elements 1,2,3
```

```
Out[9]: ['b', 'c', 'd']
```

```
In [10]: x[-2:] # Last 2 elements
```

```
Out[10]: ['c', 'd']
```

How long is the list?

```
In [11]: len(x)
```

```
Out[11]: 4
```

List methods:

```
In [12]: x.reverse() # Reverse the list (change the original list)
```

```
In [13]: x          # The list has now changed!
```

```
Out[13]: ['d', 'c', 'b', 'a']
```

This is different for strings:

```
In [15]: y = 'abc'
         y.upper()    # Create a copy of y that is upper case
         y            # String did not change! (need to reassign with y = y.upper
         ())
```

```
Out[15]: 'abc'
```

## Python dictionaries

This is a dictionary:

```
In [16]: person = {'name': 'Hank', 'age': 25, 'shape': 'needs more exercise'}
         person
```

```
Out[16]: {'name': 'Hank', 'age': 25, 'shape': 'needs more exercise'}
```

Access entries of dictionary:

```
In [17]: person['age']
```

```
Out[17]: 25
```

```
In [18]: person['shape']
```

```
Out[18]: 'needs more exercise'
```

Add another entry:

```
In [19]: person['parents'] = {'mom': 'Bertha', 'dad': 'Albert'}
```

```
In [20]: person
```

```
Out[20]: {'name': 'Hank',
          'age': 25,
          'shape': 'needs more exercise',
          'parents': {'mom': 'Bertha', 'dad': 'Albert'}}
```

Who is the persons mom?

```
In [21]: person['parents']['mom']
```

```
Out[21]: 'Bertha'
```

Dictionaries consists of pairs of keys and values:

```
In [22]: person.keys()  # keys of person
```

```
Out[22]: dict_keys(['name', 'age', 'shape', 'parents'])
```

```
In [23]: list(person.keys())  # list of keys
```

```
Out[23]: ['name', 'age', 'shape', 'parents']
```

```
In [24]: person.values()  # Values of person
```

```
Out[24]: dict_values(['Hank', 25, 'needs more exercise', {'mom': 'Bertha', 'dad': 'Albert'}])
```

Keys and values of 'parents':

```
In [25]: person['parents'].keys()
```

```
Out[25]: dict_keys(['mom', 'dad'])
```

```
In [26]: person['parents'].values()
```

```
Out[26]: dict_values(['Bertha', 'Albert'])
```

## SEC file as dictionary

```
In [27]: symbols = requests.get('https://www.sec.gov/files/company_tickers.json').json()
```

What type is this:

```
In [28]: type(symbols)
```

```
Out[28]: dict
```

```
In [32]: k = list(symbols.keys())  # list of keys  
          k[:10]
```

```
Out[32]: ['0', '1', '2', '3', '4', '5', '6', '7', '8', '9']
```

```
In [33]: v = list(symbols.values()) # list of values
v[:10]
```

```
Out[33]: [{'cik_str': 320193, 'ticker': 'AAPL', 'title': 'Apple Inc.'},
{'cik_str': 789019, 'ticker': 'MSFT', 'title': 'MICROSOFT CORP'},
{'cik_str': 1018724, 'ticker': 'AMZN', 'title': 'AMAZON COM INC'},
{'cik_str': 1652044, 'ticker': 'GOOG', 'title': 'Alphabet Inc.'},
{'cik_str': 1318605, 'ticker': 'TSLA', 'title': 'Tesla, Inc.'},
{'cik_str': 1326801, 'ticker': 'FB', 'title': 'Facebook Inc'},
{'cik_str': 1293451, 'ticker': 'TCEHY', 'title': 'Tencent Holdings Lt
d'},
{'cik_str': 1577552, 'ticker': 'BABA', 'title': 'Alibaba Group Holding
Ltd'},
{'cik_str': 1046179,
'ticker': 'TSM',
'title': 'TAIWAN SEMICONDUCTOR MANUFACTURING CO LTD'},
{'cik_str': 1067983, 'ticker': 'BRK-A', 'title': 'BERKSHIRE HATHAWAY I
NC'}]
```

Select entries:

```
In [34]: symbols['0'] # note: the keys here are strings, so we write '0'
```

```
Out[34]: {'cik_str': 320193, 'ticker': 'AAPL', 'title': 'Apple Inc.'}
```

```
In [35]: symbols['1']
```

```
Out[35]: {'cik_str': 789019, 'ticker': 'MSFT', 'title': 'MICROSOFT CORP'}
```

```
In [36]: symbols['2']['ticker']
```

```
Out[36]: 'AMZN'
```

How many symbols:

```
In [37]: len(symbols)
```

```
Out[37]: 11228
```

## For loops

```
In [38]: for i in range(2,6): # Repeat the code below for i = 2,3,4,5
print(i)
```

```
2
3
4
5
```

```
In [39]: for i in range(6): # Start from 0
         print(i)
```

```
0
1
2
3
4
5
```

We can also loop over objects:

```
In [40]: for c in 'abcd': # Loop over a string
         print(c.upper())
```

```
A
B
C
D
```

```
In [41]: for j in [1,3,5]: # Loop over llist
         print(j)
```

```
1
3
5
```

```
In [42]: for k in person.keys(): # Loop over keys of dictionary
         print(k)
```

```
name
age
shape
parents
```

```
In [43]: for k in person.values(): # Loop over values of dictionary
         print(k)
```

```
Hank
25
needs more exercise
{'mom': 'Bertha', 'dad': 'Albert'}
```

```
In [44]: for k in symbols.keys():      # Loop over keys of symbols
         if int(k) < 10:              # Print key if key < 10 (need to convert key
         print(k)                    to integer to compare)
```

```
0
1
2
3
4
5
6
7
8
9
```

```
In [45]: for v in symbols.values():      # Loop over values of sy
         mbols
         if v['title'] == 'JPMORGAN CHASE & CO':  # Print value if title =
         = ...
         print(v)
```

```
{'cik_str': 19617, 'ticker': 'JPM', 'title': 'JPMORGAN CHASE & CO'}
{'cik_str': 19617, 'ticker': 'JPM-PC', 'title': 'JPMORGAN CHASE & CO'}
{'cik_str': 19617, 'ticker': 'JPM-PD', 'title': 'JPMORGAN CHASE & CO'}
{'cik_str': 19617, 'ticker': 'AMJ', 'title': 'JPMORGAN CHASE & CO'}
{'cik_str': 19617, 'ticker': 'PPLN', 'title': 'JPMORGAN CHASE & CO'}
{'cik_str': 19617, 'ticker': 'JPM-PJ', 'title': 'JPMORGAN CHASE & CO'}
{'cik_str': 19617, 'ticker': 'JPM-PG', 'title': 'JPMORGAN CHASE & CO'}
{'cik_str': 19617, 'ticker': 'JPM-PH', 'title': 'JPMORGAN CHASE & CO'}
```

```
In [ ]: # Print all entries where ticker symbol contains '-P' (preferred stock)

for v in symbols.values():
    if v['ticker'].find('-P') >= 0:
        print(v)
```