So far we have learned about different data types such as lists and tuples. Now we want to learn about a new data structure called dictionary.

Dictionaries are similar to lists, both are dynamic, both are mutable and both can be nested. However, dictionaries differ from lists in the way items are accessed:

> In lists items are accessed via indexing.
> In dictionaries items are accessed via keys.

We work with pairs of keys:values in dictionaries.

In [1]:
```
#ways of defining a dictionary:

d = {
    'Russia': 'Moscow',
    'Germany':'Berlin',
    'Japan':'Tokyo',
    'Spain': 'Madrid'
}

d = dict([ ('Russia', 'Moscow'),
         ('Germany', 'Berlin'),
         ('Japan', 'Tokyo'),
         ('Spain', 'Madric')])


d = dict(Russia='Moscow',
         Germany='Berlin',
         Japan='Tokyo',
        Spain='Madrid')
```

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

Out[2]:
```
dict
```

In [ ]:
```

```

In [3]:
```
#acessing dictionary values
d['Russia']
```

Out[3]:
```
'Moscow'
```

In [4]:
```
d['Japan']
```

Out[4]:
```
'Tokyo'
```

In [3]:
```
d['italy']
```

Out[3]:
```
'Milan'
```

In [2]:
```
#adding or updating an entry:
d['italy'] = 'Milan'
```

In [4]:
```
d['italy']
print(d)
```

```
{'Russia': 'Moscow', 'Germany': 'Berlin', 'Japan': 'Tokyo', 'Spain': 'Madrid', 'italy': 'Milan'}
```

In [5]:
```
#deleting an entry
del(d['italy'])
print(d)
```

```
{'Russia': 'Moscow', 'Germany': 'Berlin', 'Japan': 'Tokyo', 'Spain': 'Madrid'}
```

In [7]:
```
#building an dictinary incrementally
dic = {}
type(dic)
```

Out[7]:
```
dict
```

In [8]:
```
dic['Ali']=18
dic["Reze"] = 21
dic["Hasan"] = 17
dic
```

Out[8]:
```
{'Ali': 18, 'Reze': 21, 'Hasan': 17}
```

In [12]:
```
dic = {1:'aaa', 'b':'ccsds', True:64}
```

In [15]:
```
#restrictions on dictionary keys
#no duplicate keys
#keys should be immutable
```

In [16]:
```
d = {
    'Russia': 'Moscow',
    'Germany':'Berlin',
    'Japan':'Tokyo',
    'Spain': 'Madrid'
}
```

In [17]:
```
len(d)
```

Out[17]:
```
4
```

In [30]:
```
#merging two dictionaries
d1 = {'a': 20, 'b': 30, 'c': 40}
d2 = {'d': 50, 'e':60}

d1.update(d2)
d1
```

Out[30]:
```
{'a': 20, 'b': 30, 'c': 40, 'd': 50, 'e': 60}
```

In [18]:
```
'Russia' in d
```

Out[18]:
```
True
```

In [19]:
```
'India' in d
```

Out[19]:
```
False
```

In [20]:
```
#Built-in dictionary methods
d.clear()
```

In [9]:
```
d.get('Spain', 'Not found')
```

Out[9]:
```
'Madrid'
```

In [10]:
```
d.get('India', 'Not Found')
```

Out[10]:
```
'Not Found'
```

In [24]:
```
d.items()
```

Out[24]:
```
dict_items([('Russia', 'Moscow'), ('Germany', 'Berlin'), ('Japan', 'Tokyo'), ('Spain', 'Madrid')])
```

In [25]:
```
d.keys()
```

Out[25]:
```
dict_keys(['Russia', 'Germany', 'Japan', 'Spain'])
```

In [26]:
```
d.values()
```

Out[26]:
```
dict_values(['Moscow', 'Berlin', 'Tokyo', 'Madrid'])
```

In [ ]:
```
#iterating through dictionaries
```

In [31]:
```
d = {
    'Russia': 'Moscow',
    'Germany':'Berlin',
    'Japan':'Tokyo',
    'Spain': 'Madrid'
}
```

In [32]:
```
#iterating directly thorough keys
for key in d:
    print(key)
```

```
Russia
Germany
Japan
Spain
```

In [34]:
```
#iterating with keys()
for key in d.keys():
    print(key)
```

```
Russia
Germany
Japan
Spain
```

In [ ]:
```

```

In [35]:
```
d.values()
```

Out[35]:
```
dict_values(['Moscow', 'Berlin', 'Tokyo', 'Madrid'])
```

In [36]:
```
#iterating through values
for val in d.values():
    print(val)
```

```
Moscow
Berlin
Tokyo
Madrid
```

In [37]:
```
#tuple unpacking review
x,y = (2,3)
print(x)
print(y)
```

```
2
3
```

In [38]:
```
d.items()
```

Out[38]:
```
dict_items([('Russia', 'Moscow'), ('Germany', 'Berlin'), ('Japan', 'Tokyo'), ('Spain', 'Madrid')])
```

In [42]:
```
for item in d.items():
    print(item)
```

```
('Russia', 'Moscow')
('Germany', 'Berlin')
('Japan', 'Tokyo')
('Spain', 'Madrid')
```

In [43]:
```
for key,value in d.items():
    print(key, '->', value)
```

```
Russia -> Moscow
Germany -> Berlin
Japan -> Tokyo
Spain -> Madrid
```

In [48]:
```
#real world examples
sales_data = {'laptop':300000, 'phone': 250000, 'tablet':100000, 'headphone': 80000}
```

In [49]:
```
new_data = {}
for key, value in sales_data.items():
    if value >= 150000:
        new_data[key] = value

new_data
```

Out[49]:
```
{'laptop': 300000, 'phone': 250000}
```

In [50]:
```
total_sale = 0
for value in sales_data.values():
    total_sale += value

print(total_sale)
```

```
730000
```