

Tuples

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Tuples Are Like Lists

Tuples are another kind of sequence that functions much like a list
- they have elements which are indexed starting at 0

```
>>> x = ( 'Glenn', 'Sally', 'Joseph' )
```

```
>>> print(x[2])
```

```
Joseph
```

```
>>> y = ( 1, 9, 2 )
```

```
>>> print(y)
```

```
(1, 9, 2)
```

```
>>> print(max(y))
```

```
9
```

```
>>> for iter in y:  
...     print(iter)
```

```
...
```

```
1
```

```
9
```

```
2
```

```
>>>
```

but... Tuples are “immutable”

Unlike a list, once you create a **tuple**, you **cannot alter** its contents - similar to a string

```
>>> x = [9, 8, 7]
>>> x[2] = 6
>>> print(x)
>>> [9, 8, 6]
>>>
```

```
>>> y = 'ABC'
>>> y[2] = 'D'
Traceback: 'str'
object does
not support item
Assignment
>>>
```

```
>>> z = (5, 4, 3)
>>> z[2] = 0
Traceback: 'tuple'
object does
not support item
Assignment
>>>
```

Things not to do With Tuples

```
>>> x = (3, 2, 1)
```

```
>>> x.sort()
```

```
Traceback:
```

```
AttributeError: 'tuple' object has no attribute 'sort'
```

```
>>> x.append(5)
```

```
Traceback:
```

```
AttributeError: 'tuple' object has no attribute 'append'
```

```
>>> x.reverse()
```

```
Traceback:
```

```
AttributeError: 'tuple' object has no attribute 'reverse'
```

```
>>>
```

A Tale of Two Sequences

```
>>> l = list()
>>> dir(l)
['append', 'count', 'extend', 'index', 'insert', 'pop',
 'remove', 'reverse', 'sort']
```

```
>>> t = tuple()
>>> dir(t)
['count', 'index']
```

Tuples are More Efficient

- Since Python does not have to build tuple structures to be modifiable, they are simpler and more efficient in terms of memory use and performance than lists
- So in our program when we are making “temporary variables” we prefer tuples over lists

Tuples and Assignment

- We can also put a **tuple** on the **left-hand side** of an assignment statement
- We can even omit the parentheses

```
>>> (x, y) = (4, 'fred')
>>> print(y)
fred
>>> (a, b) = (99, 98)
>>> print(a)
99
```

Tuples and Dictionaries

The `items()` method
in dictionaries
returns a list of (key,
value) **tuples**

```
>>> d = dict()
>>> d['csev'] = 2
>>> d['cwen'] = 4
>>> for (k,v) in d.items():
...     print(k, v)
...
csev 2
cwen 4
>>> tups = d.items()
>>> print(tups)
dict_items([('csev', 2), ('cwen', 4)])
```


Tuples are Comparable

The comparison **operators** work with **tuples** and other sequences. If the first item is equal, Python goes on to the next element, and so on, until it finds elements that differ.

```
>>> (0, 1, 2) < (5, 1, 2)
True
>>> (0, 1, 2000000) < (0, 3, 4)
True
>>> ( 'Jones', 'Sally' ) < ( 'Jones', 'Sam' )
True
>>> ( 'Jones', 'Sally' ) > ( 'Adams', 'Sam' )
True
```

Sorting Lists of Tuples

- We can take advantage of the ability to sort a list of **tuples** to get a sorted version of a dictionary
- First we sort the dictionary by the key using the **items()** method and **sorted()** function

```
>>> d = {'a':10, 'b':1, 'c':22}
>>> d.items()
dict_items([('a', 10), ('c', 22), ('b', 1)])
>>> sorted(d.items())
[('a', 10), ('b', 1), ('c', 22)]
```

Using sorted()

We can do this even more directly using the built-in function `sorted` that takes a sequence as a parameter and returns a sorted sequence

```
>>> d = {'a':10, 'b':1, 'c':22}
>>> t = sorted(d.items())
>>> t
[('a', 10), ('b', 1), ('c', 22)]
>>> for k, v in sorted(d.items()):
...     print(k, v)
...
a 10
b 1
c 22
```

Sort by Values Instead of Key

- If we could construct a list of **tuples** of the form **(value, key)** we could **sort** by value
- We do this with a **for** loop that creates a list of tuples

```
>>> c = {'a':10, 'b':1, 'c':22}
>>> tmp = list()
>>> for k, v in c.items() :
...     tmp.append( (v, k) )
...
>>> print(tmp)
[(10, 'a'), (22, 'c'), (1, 'b')]
>>> tmp = sorted(tmp, reverse=True)
>>> print(tmp)
[(22, 'c'), (10, 'a'), (1, 'b')]
```

```
fhand = open('romeo.txt')
counts = {}
for line in fhand:
    words = line.split()
    for word in words:
        counts[word] = counts.get(word, 0) + 1

lst = []
for key, val in counts.items():
    newtup = (val, key)
    lst.append(newtup)

lst = sorted(lst, reverse=True)

for val, key in lst[:10]:
    print(key, val)
```

The top 10 most
common words

Even Shorter Version

```
>>> c = {'a':10, 'b':1, 'c':22}
```

```
>>> print( sorted( [ (v,k) for k,v in c.items() ] ) )
```

```
[(1, 'b'), (10, 'a'), (22, 'c')]
```

List comprehension creates a dynamic list. In this case, we make a list of reversed tuples and then sort it.

<http://wiki.python.org/moin/HowTo/Sorting>

Summary

- Tuple syntax
- Immutability
- Comparability
- Sorting
- Tuples in assignment statements
- Sorting dictionaries by either key or value