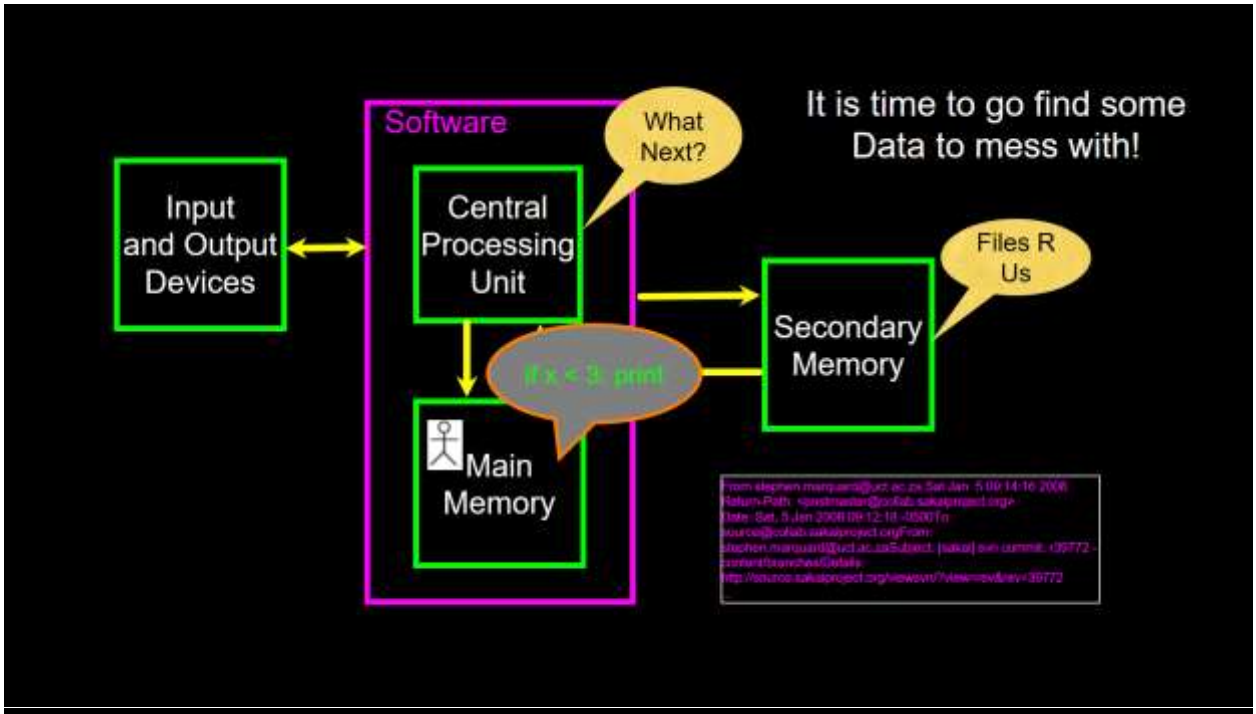
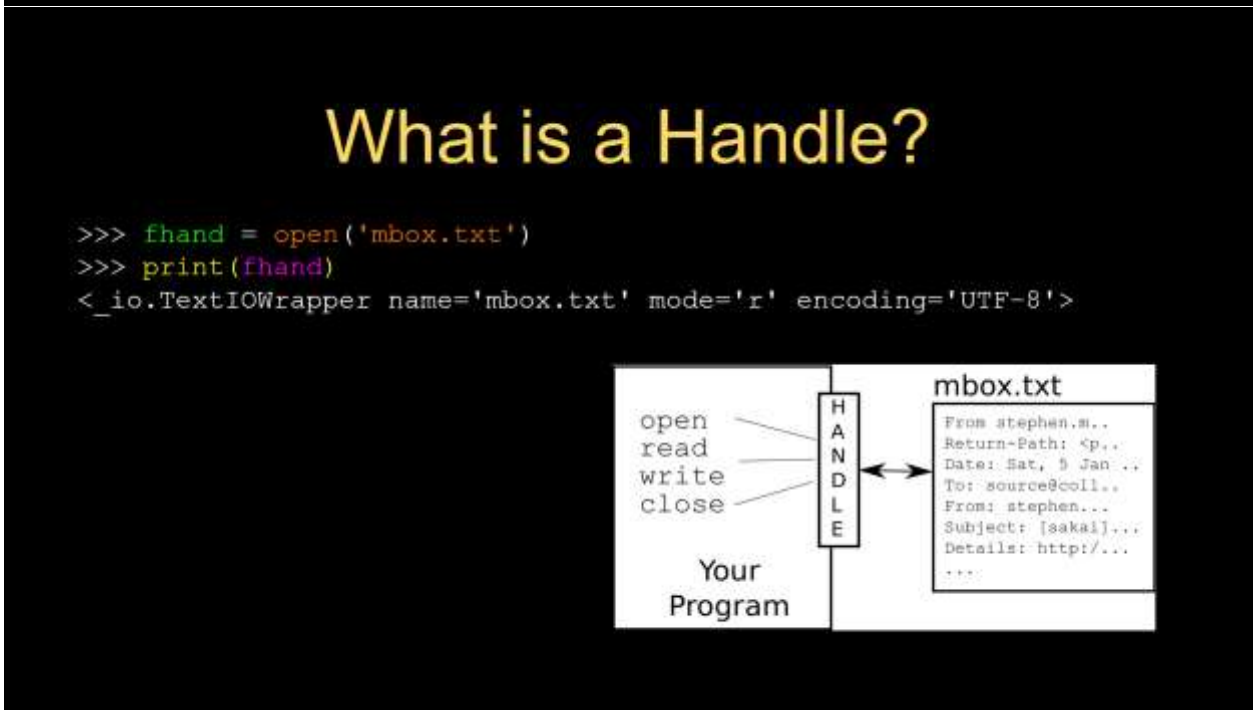
Лабораторное занятие 3. Создание программы на языке Python. Файлы. Словари. Кортежи.

3-зертханалық сабақ. Python тілінде бағдарлама құру. Файлдар. Сөздіктер. Кортеждар.

Келесі есептерді Anaconda(Python) ортасында жазып оқытушыға түсіндіреміз.

Пишем в среде Anaconda(Python) написать коды и объяснить преподавателю.





The newline Character

- We use a special character called the "newline" to indicate when a line ends
- We represent it as \n in strings
- Newline is still one character - not two

```
>>> stuff = 'Hello\nWorld!'
>>> stuff
'Hello\nWorld!'
>>> print(stuff)
Hello
World!
>>> stuff = 'X\nY'
>>> print(stuff)
X
Y
>>> len(stuff)
3
```

File Handle as a Sequence

- A file handle open for read can be treated as a sequence of strings where each line in the file is a string in the sequence
- We can use the for statement to iterate through a sequence
- Remember - a sequence is an ordered set

```
xfile = open('mbox.txt')
for cheese in xfile:
    print(cheese)
```

Counting Lines in a File

- Open a file read-only
- Use a for loop to read each line
- Count the lines and print out the number of lines

```
fhand = open('mbox.txt')
count = 0
for line in fhand:
    count = count + 1
print('Line Count:', count)
```

```
$ python open.py
Line Count: 132045
```

Reading the *Whole* File

We can read the whole file (newlines and all) into a single string

```
>>> fhand = open('mbox-short.txt')
>>> inp = fhand.read()
>>> print(len(inp))
94626
>>> print(inp[:20])
From stephen.marquar
```

Searching Through a File

We can put an if statement in our for loop to only print lines that meet some criteria

```
fhand = open('mbox-short.txt')
for line in fhand:
    if line.startswith('From:') :
        print(line)
```

A Story of Two Collections..

- List

  - A linear collection of values that stay in order

- Dictionary

  - A “bag” of values, each with its own label

Dictionaries

- Словари - самый мощный сборщик данных Python
- Словари позволяют нам выполнять быстрые операции с базами данных в Python
- Словари имеют разные названия на разных языках
- - Ассоциативные массивы - Perl / PHP
- - Свойства или Карта или HashMap - Java
- - Property Bag - C # / .Net

Dictionaries

- Списки индексируют свои записи на основе позиции в спискеСловари как сумки - нет порядкаТаким образом, мы индексируем вещи, которые мы помещаем в словарь, с помощью «тега поиска»

```
>>> purse = dict()
>>> purse['money'] = 12
>>> purse['candy'] = 3
>>> purse['tissues'] = 75
>>> print(purse)
{'money': 12, 'tissues': 75, 'candy': 3}
>>> print(purse['candy'])
3
>>> purse['candy'] = purse['candy'] + 2
>>> print(purse)
{'money': 12, 'tissues': 75, 'candy': 5}
```

Comparing Lists and Dictionaries

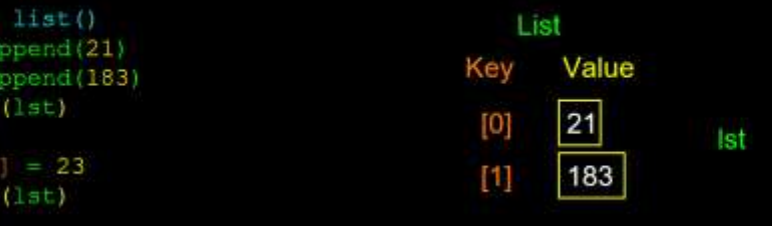
Dictionaries are like lists except that they use keys instead of numbers to look up values

```
>>> lst = list()
>>> lst.append(21)
>>> lst.append(183)
>>> print(lst)
[21, 183]
>>> lst[0] = 23
>>> print(lst)
[23, 183]
```

```
>>> ddd = dict()
>>> ddd['age'] = 21
>>> ddd['course'] = 182
>>> print(ddd)
{'course': 182, 'age': 21}
>>> ddd['age'] = 23
>>> print(ddd)
{'course': 182, 'age': 23}
```


```
>>> lst = list()
>>> lst.append(21)
>>> lst.append(183)
>>> print(lst)
[21, 183]
>>> lst[0] = 23
>>> print(lst)
[23, 183]
```

```
>>> ddd = dict()
>>> ddd['age'] = 21
>>> ddd['course'] = 182
>>> print(ddd)
{'course': 182, 'age': 21}
>>> ddd['age'] = 23
>>> print(ddd)
{'course': 182, 'age': 23}
```

Dictionary Literals (Constants)

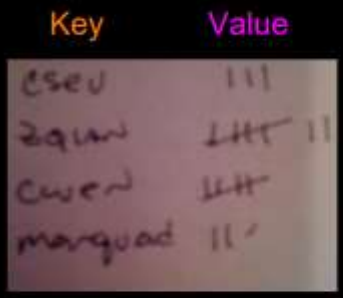
- Dictionary literals use curly braces and have a list of key : value pairs
- You can make an empty dictionary using empty curly braces

```
>>> jjj = { 'chuck' : 1 , 'fred' : 42, 'jan': 100}
>>> print(jjj)
{'jan': 100, 'chuck': 1, 'fred': 42}
>>> ooo = { }
>>> print(ooo)
{}
>>>
```

Many Counters with a Dictionary

Самое распространенное имя?Одним из наиболее часто используемых словарей является подсчет того, как часто мы «видим» что-то

```
>>> ccc = dict()
>>> ccc['csev'] = 1
>>> ccc['cwen'] = 1
>>> print(ccc)
{'csev': 1, 'cwen': 1}
>>> ccc['cwen'] = ccc['cwen'] + 1
>>> print(ccc)
{'csev': 1, 'cwen': 2}
```



Simplified Counting with get()

We can use get() and provide a default value of zero when the key is not yet in the dictionary - and then just add one

```
counts = dict()
names = ['csev', 'cwen', 'csev', 'zqian', 'cwen']
for name in names :
    counts[name] = counts.get(name, 0) + 1
print(counts)
```

Default

{'csev': 2, 'zqian': 1, 'cwen': 2}

Definite Loops and Dictionaries

Even though dictionaries are not stored in order, we can write a for loop that goes through all the entries in a dictionary - actually it goes through all of the keys in the dictionary and looks up the values

```
>>> counts = { 'chuck' : 1 , 'fred' : 42, 'jan': 100}
>>> for key in counts:
...     print(key, counts[key])
...
jan 100
chuck 1
fred 42
>>>
```

Retrieving Lists of Keys and Values

You can get a list of keys, values, or items (both) from a dictionary

```
>>> jjj = { 'chuck' : 1 , 'fred' : 42, 'jan': 100}
>>> print(list(jjj))
['jan', 'chuck', 'fred']
>>> print(jjj.keys())
['jan', 'chuck', 'fred']
>>> print(jjj.values())
[100, 1, 42]
>>> print(jjj.items())
[('jan', 100), ('chuck', 1), ('fred', 42)]
>>>
```

What is a “tuple”? - coming soon...

Bonus: Two Iteration Variables!

- We loop through the key-value pairs in a dictionary using *two* iteration variables
- Each iteration, the first variable is the key and the second variable is the corresponding value for the key

```
jjj = { 'chuck' : 1 , 'fred' : 42, 'jan': 100}
for aaa,bbb in jjj.items() :
    print(aaa, bbb)
```

```
jan 100
chuck 1
fred 42
```

aaa	bbb
[jan]	100
[chuck]	1
[fred]	42

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 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)])
```

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()

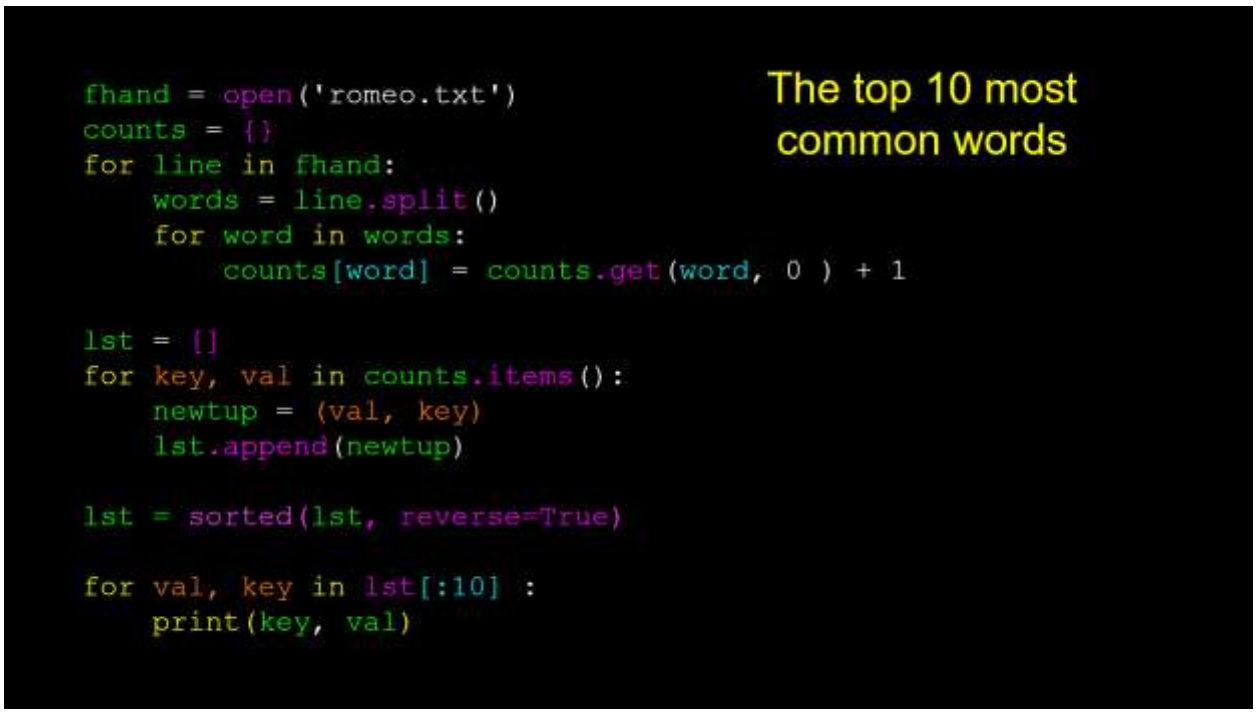
We can do this even more directly using the built-in function sorted that takes a sequence as a parameter and returns a sorted sequence

```
>>> 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')]
```



Келесі есептерді осы мысалдарға қарап сөздіктер мен кортеждер әдістерімен толықтыру.

Дополнить следующий код, добавить разные методов для кортежей и словарей.

```
group=('Arai','Abai','Moldir','Diana','Aidar')
print('topta',len(group),'student bar')  new_group=('Jaksylyk','Janna','Akmaral',group)
print('topta',len(new_group),'oryn bar')
print('eski toptan kelgen studentter:', new_group[3])  print('eski toptan kelgen songy student:',
new_group[3][4])  dict={'Arai':'arai@gmail.com',
    'Abai':'abai_b@gmail.com',
    'Moldir':'moldir@bk.ru',
    'Diana':'diana@mail.ru',
    'Aidar':'aidar_k@gmail.com',
    'Spammer':'spma@mail.ru'}print('adress Arai', dict['Arai'])
print('jana toptagy studentter:', new_group)
del dict['Spammer']

print('adress bazasynda {0} kontakt bar'.format(len(dict)))

for name , adress in dict.items():

   print('kontakt {0} adresi {1}'.format(name,adress))

dict['jaksylyk']='jaksylyk@gmail.com'

if 'jaksylyk' in dict:

   print('adress jaksylyk:', dict['jaksylyk'])
```