

RXKA|CBT

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python



به نام پروردگار دانایی

برنامه نویسی به سبک پایتون

پدرام شاه صفی

بهار ۱۳۹۴



ایجاد، مقدار دهی و حذف متغیر

```
x = a_python_type  
x = value  
  
del x
```

```
x=int()  
type(x)  
id(x)  
  
x=12  
type(x)  
id(x)
```

نام گذاری متغیرها

```
'''  
We are in  
Multiple  
Line  
Comments  
'''  
  
Name="pd"           #It is my name  
name="python"       #He is my friend  
  
print("name=", name, "\tName=",Name)
```



Ken Thompson

(He is well known as the principal creator of the UNIX operating system and is also the co-creator of the Go programming language)

<u>Keyword</u>	<u>explain</u>	<u>Keyword</u>	<u>explain</u>
print	<i>print to console</i>	while	<i>controlling the flow</i>
for	<i>iterate over items</i>	break	<i>interrupt the loop</i>
continue	<i>interrupt current cycle</i>	if	<i>which statements execute</i>
elif	<i>else if</i>	else	<i>which statements execute</i>
is	<i>tests for object identity</i>	not	<i>negates a boolean value</i>
and	<i>all conditions must be met</i>	or	<i>at least one condition must be met</i>
import	<i>import other modules</i>	as	<i>give a module a different alias</i>
from	<i>for importing things</i>	def	<i>define function</i>
return	<i>exits and returns a value</i>	lambda	<i>creates a new anonymous function</i>
global	<i>about variables</i>	try	<i>specifies exception handlers</i>
except	<i>catches the exception</i>	finally	<i>always executed in the end</i>
raise	<i>create a user defined exception</i>	del	<i>deletes objects</i>
pass	<i>does nothing</i>	assert	<i>used for debugging purposes</i>
class	<i>used to create class</i>	exec	<i>executes Python code dynamically</i>
yield	<i>is used with generators</i>		

متغیر همنام با کلمات کلیدی

```
print("Python")  
print="pyhton"  
print("Python")
```

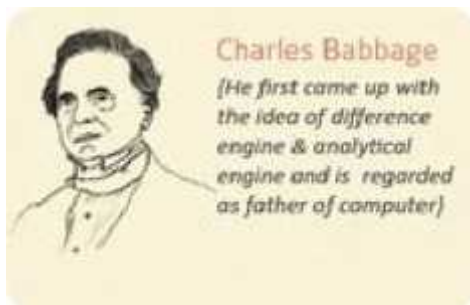
Q: What is a programmer's
favourite hangout place?

A: Foo Bar

دسته بندی متغیرها

- تغییر پذیر
 - دیکشنری
 - لیست

- تغییر ناپذیر
 - اعداد
 - رشته ها
 - تاپل



درست یا نادرست

```
bool (-1)  
bool (-0.5)  
bool (0)  
bool (0.5)  
bool (1)
```

```
x=False  
print (type (x) )
```

Edsger Dijkstra

(He is known for Dijkstra's algorithm, which is a graph search algorithm that solves the single-source shortest path problem for a graph with nonnegative edge path costs)





```
x=None  
print (type (x) , x*5 , x+'5' )
```

John Backus

[He is well known for the development of FORTRAN and ALGOL. He is also the inventor of Backus-Naur form and has also helped to popularize functional level programming]



حدود

```
x=range(10)
x=range(1,10)
x=range(1,10,5)
print(x, type(x))
```



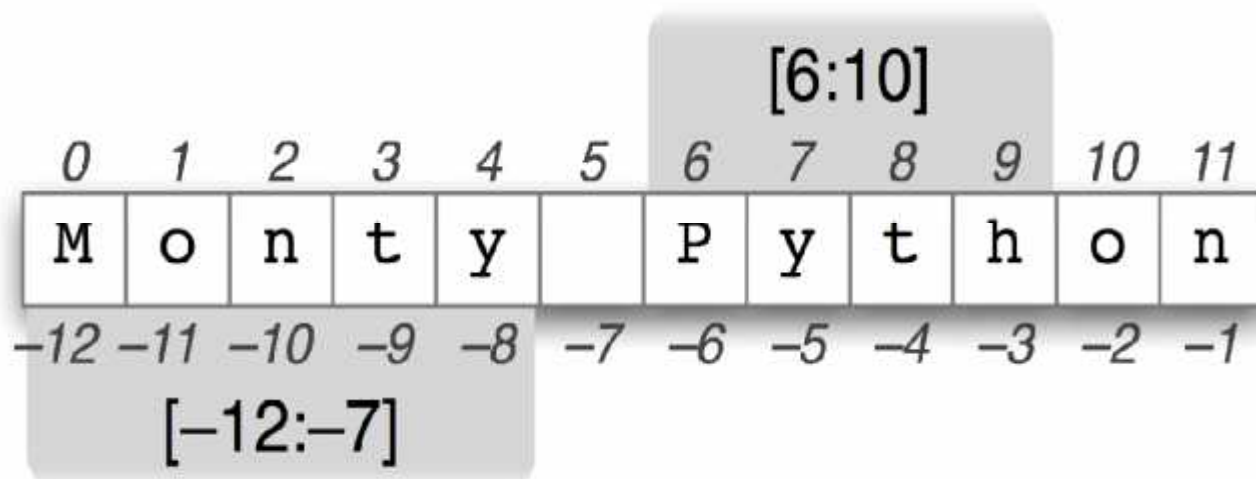
اعداد

- اعداد صحیح
- اعداد اعشاری
- اعداد مختلط
- اعداد بزرگ

Alan Turing

(He is well known for the Halting problem, Turing machines, cryptanalysis of Enigma & Turing test. Turing award is given annually for exceptional work in the field of computing)





```
STR='Python'
STR='J'+STR[1:]
print(STR)
```

```
STR='Python'
STR='Py'+STR[:2]
print(STR)
```

<u>Function</u>	<u>Description</u>	<u>Function</u>	<u>Description</u>
count('x')	<i>counts the number of occurrences of 'x' in stringVar.</i>	title()	<i>Return Title format.</i>
find('x')	<i>returns the position of character 'x'.</i>	capitalize()	<i>First character in uppercase others in lowercase.</i>
lower()	<i>returns the stringVar in lowercase.</i>	rjust(x)	<i>Put space from right.</i>
upper()	<i>the stringVar in uppercase</i>	len(x)	<i>Return length of x.</i>
replace('a', 'b')	<i>replaces all occurrences of a with b in the string.</i>	center(x)	<i>Return a string by length of x</i>
strip()	<i>removes leading/trailing white space from string</i>	endswith(x)	<i>Return True or False</i>
startswith(x)	<i>Return True or False</i>	isalnum()	<i>Return True or False</i>
split(x)	<i>Split string by x</i>	isdigit()	<i>Return True or False</i>
zfill(x)	<i>Fill by zero .x= length</i>	in	<i>fast membership testing.</i>

چاپ رشته

```
print("Van Rossum " + 'was born ' , "and" "grew up in the Netherlands\  
    he received a master\'s or master's " ,  
    'degree in mathematics and computer'  
    'science'  
    'from'  
    ''  
    the  
    University  
    of Amsterdam  
    in  
    1982  
    :)  
    ''')
```

Larry Wall

*(He is well known for the
creation of Perl programming
language and is also the first
recipient of the Free Software
Foundation Award for the
Advancement of Free
Software)*



متغیرهای دودویی

```
x=b'still'  
type(x)  
  
x=bytearray()  
type(x)
```

Algorithm (noun.)

Word used by programmers when...
they do not want to explain what they did.

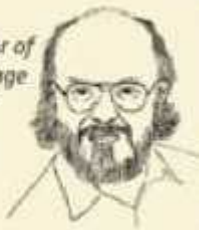
لیست

```
List=[1, 'x', "string",  
      ['a','b','c',5],  
      {'1':'a'},  
      range(10), False]
```

```
list[from:to:step]
```

James Gosling

[He is known as the father of Java programming language and is also the creator of Gosmacs, which was the first Emacs to run under UNIX]



لیست چند بعدی

```
x=[  
    [ '00' , '01' , '02' ] ,  
    [ '10' , '11' , '12' ],  
    [ '20' , '21' , '22' ],  
]  
  
print(x[2])  
print(x[2][1])  
print(x[2][1][0])
```

A foo walks into a bar,
takes a look around
and says "Hello World!".

توابع تجمعی

```
x=[1,2,3,4,5,6]
```

```
max(x)
```

```
min(x)
```

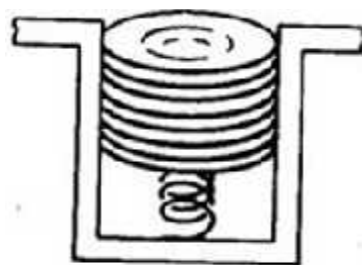
```
sum(x)
```

How do you tell HTML from HTML5?

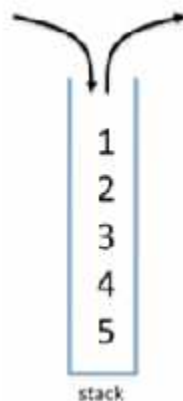
- Try it out in Internet Explorer.
- Did it work?
- No?
- It's HTML5.

<u>Function</u>	<u>Description</u>	<u>Function</u>	<u>Description</u>
append(x)	<i>appends element to end of the list</i>	remove(x)	<i>finds and removes first 'x' from list</i>
clear()	<i>Delete list content</i>	reverse()	<i>reverses the elements in the list</i>
count(x)	<i>counts the number of occurrences of 'x' in the list</i>	sort()	<i>sorts the list alphabetically in ascending order, or numerical in ascending order</i>
index(x)	<i>returns the index of 'x' in the list</i>	in	<i>fast membership testing.</i>
insert(y,x)	<i>'x' at location 'y'</i>	str.join(iterable)	<i>Return a string which is the concatenation of the strings in the iterable iterable.</i>
pop()	<i>returns last element then removes it from the list</i>	extend([])	<i>Add several members</i>

صف و پشته



(a) Stack of dishes.



(b) Queue waiting for a bus.



Donald Knuth

(He is the creator of TEX and MMIX and is well known for the "Art of computer programming" book series. He received the Turing Award in 1974)



نگاهی از نزدیک



Q: Why do Java programmers
have to wear glasses?

A: Because they don't C#.
(see sharp)

پیاده سازی صف / پشته

```
stack = [1, 2, 3, 4, 5]
stack.append(6)
stack.append(7)
print(stack)
stack.pop()
stack.pop()
stack.pop()
print(stack)
```

```
from collections import deque
queue = deque(["python ", "Jython", "PyPy"])
queue.append("ctype")           # Terry arrives
queue.popleft()                 # The first to arrive now leaves
queue.popleft()                 # The second to arrive now leaves
print(queue)
queue.pop()                     # Stack
print(queue)
```

Ada Lovelace

*(Wrote a program to calculate
sequence of Bernoulli's
number using analytical engine.
Regarded as World's first
programmer)*



کپی محتوا یا ادرس

```
List=[[1,2],[3,4],5,6]  
x=List  
y=List[:]
```

Richard Stallman

(He is the creator of Emacs editor and the lead architect and organizer of the GNU project. He has been actively involved in the free software movement)



تاپل

```
Tuple=('c',"string",[1,2],  
      {'1':'a'},  
      ('a','b')  
      )
```

Bill Joy

(He is the co-founder of Sun Microsystems and is also the creator of vi editor, csh and NFS. He was also a primary figure in the development of Java programming language)



```
x=tuple
x.count(l) # T.count(value) -> integer
           # return number of occurrences of value

x.index(l) #T.index(value, [start, [stop]]) -> integer
           #return first index of value.
```

Programmer (noun.)

A person who fixed a problem that
you don't know you have,
in a way you don't understand.

در هم سازی

- درهم سازی یک ساختار جست و جواز مرتبه $O(1)$ است.

- تابع درهم ساز: `hashig_function(key)`

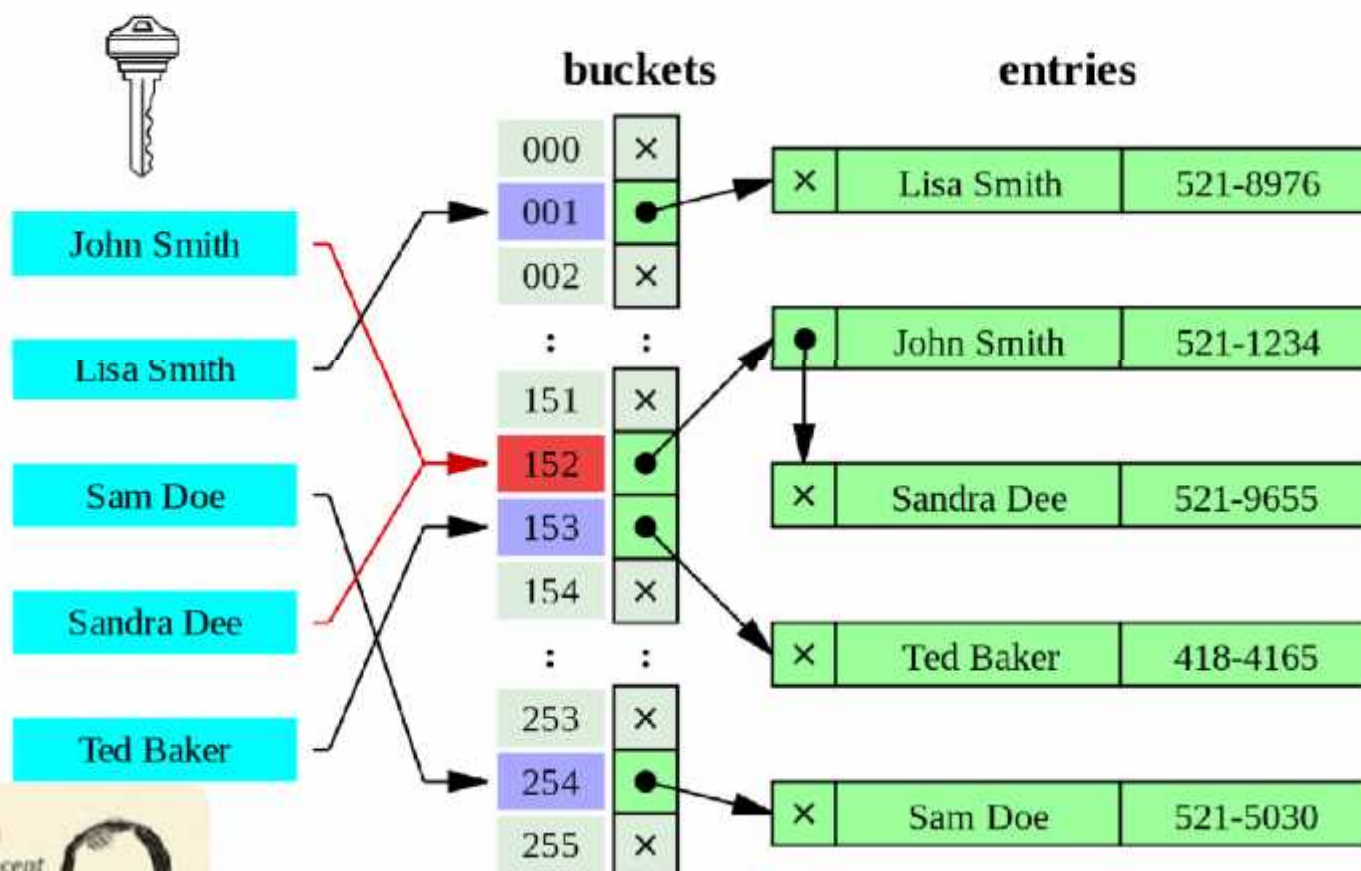
`return address_of_key`

Linus Torvalds

(He is best known for having initiated the development of Linux Kernel and the Git revision control system. He is also a strong supporter of Open Source software.)



جدول درهم سازی



John von Neumann

(He came up with the concept of stored program computer that uses a CPU and a separate storage to hold both instructions and data. This is also known as von Neumann architecture)



دیکشنری

```
Dict={  
    'key1':'value1',  
    'key2':'1',  
    3:'str',  
    4:['this','is a','list'],  
    ['this','is a','list']:4,  
    what: 'the',  
    'what': the,  
    what : the  
    2:2  
}
```



Dennis Ritchie

[He is the creator of C programming language and was also amongst the key developers of UNIX operating system. He received the Turing award in 1983]

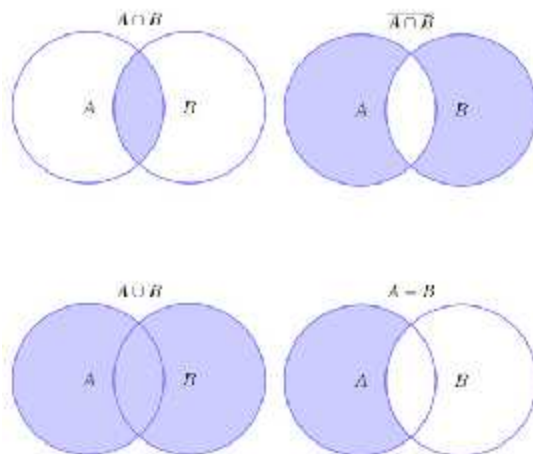
تبدیل به دیکشنری

```
seq1 = ('a','b','c','d')  
seq2 = [1,2,3,4]  
new_dict = dict(zip(seq1, seq2))
```

If you put a million monkeys
on a million keyboards,
one of them will eventually write
a Java program.

The rest of them will write
 programs.

<u>Function</u>	<u>Description</u>	<u>Function</u>	<u>Description</u>
len()	<i>Return the number of items in the dictionary d.</i>	pop(key)	<i>If key is in the dictionary, remove it and return its value.</i>
clear()	<i>Remove all items from the dictionary.</i>	popitem()	<i>Remove and return an arbitrary (key,value) pair from the dictionary.</i>
copy()	<i>Return a shallow copy of the dictionary.</i>	setdefault(key)	<i>If key is in the dictionary, return its value.</i>
get(key)	<i>Return the value for key if key is in the dictionary.</i>	update()	<i>Update the dictionary with the key/value pairs from other.</i>
items()	<i>Return a new view of the dictionary's items ((key, value) pairs).</i>	values()	<i>Return a new view of the dictionary's values.</i>
keys()	<i>Return a new view of the dictionary's keys.</i>		



```
#show that duplicates have been removed
Set0={'a','a','b'}
print(Set0)

#an empty set
Set2={} # !!!
print(type(Set2))

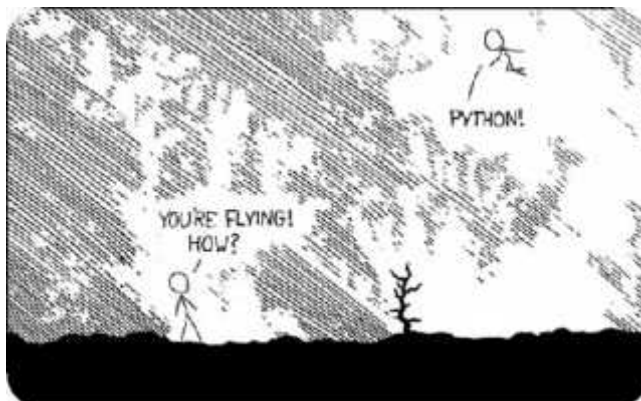
Set1=set() #OK
print(type(Set1))

#string & set
Set3=set('abacadaeafa',12,'12') # !!!
Set4=set('abacadaeafa') #OK
print(Set4)
```

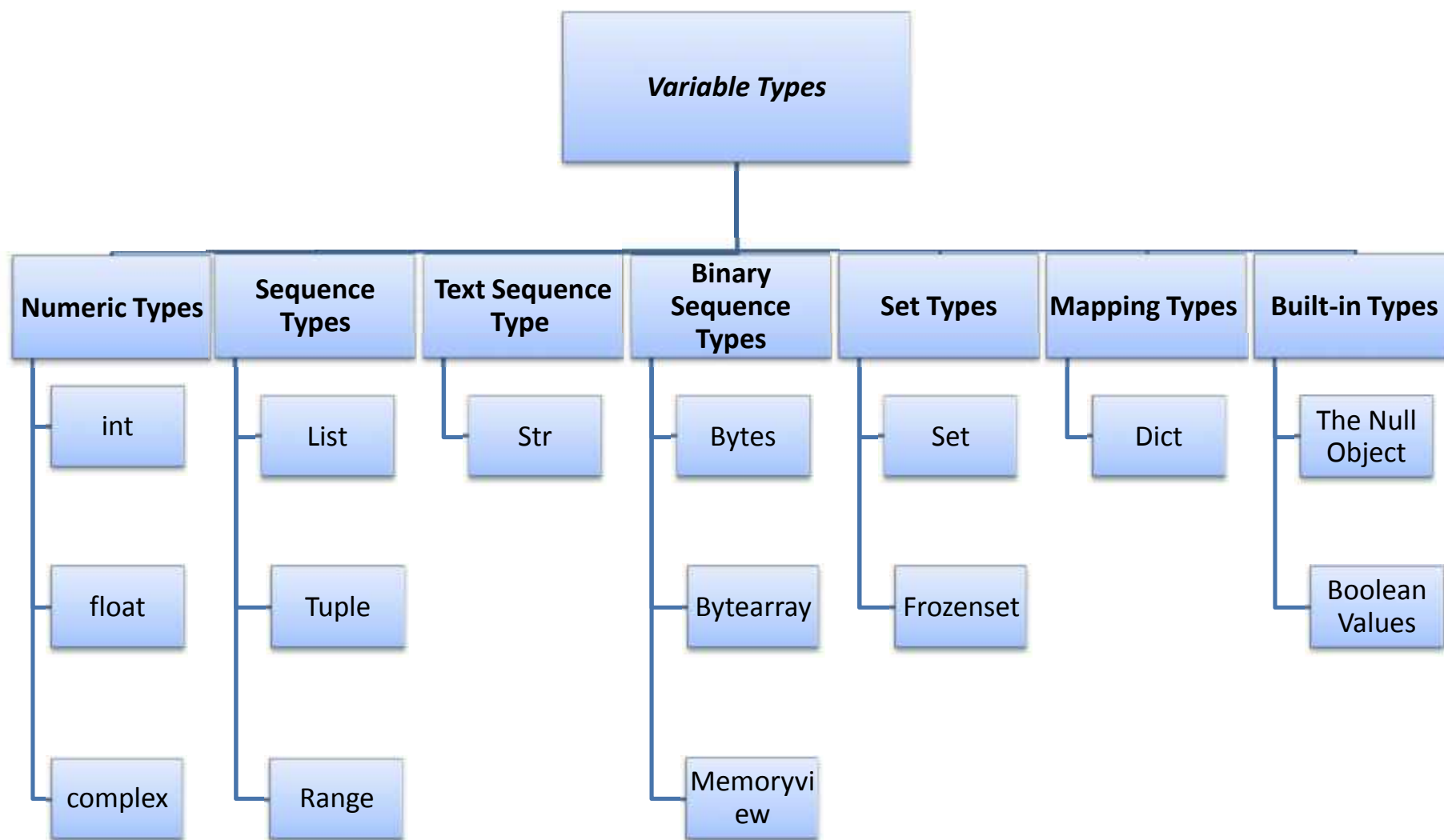

<u>Function</u>	<u>Description</u>	<u>Function</u>	<u>Description</u>
in	<i>fast membership testing.</i>	union()	<i>all elements that are in either set.</i>
a - b	<i>letters in a but not in b.</i>	intersection()	<i>all elements that are in both sets.</i>
a b	<i>letters in either a or b.</i>	discard()	<i>Remove an element from a set if it is a member.</i>
a & b	<i>letters in both a and b.</i>	intersection_update()	<i>Update a set with the intersection of itself and another.</i>
a ^ b	<i>letters in a or b but not both.</i>	isdisjoint()	<i>Return True if two sets have a null intersection.</i>
add()	<i>Add an element to a set.</i>	issubset()	<i>Report whether another set contains this set.</i>
symmetric_difference()	<i>attended only one of the events.</i>	issuperset()	<i>Report whether this set contains another set.</i>
difference()	<i>all elements that are in this set but not the others.</i>	pop()	<i>Remove and return an arbitrary set element.</i>
clear()	<i>Remove all elements from this set.</i>	remove	<i>Remove an element from a set; it must be a member.</i>
copy()	<i>Return a shallow copy of a set.</i>	difference_update()	<i>Remove all elements of another set from this set.</i>

مجموعه ثابت

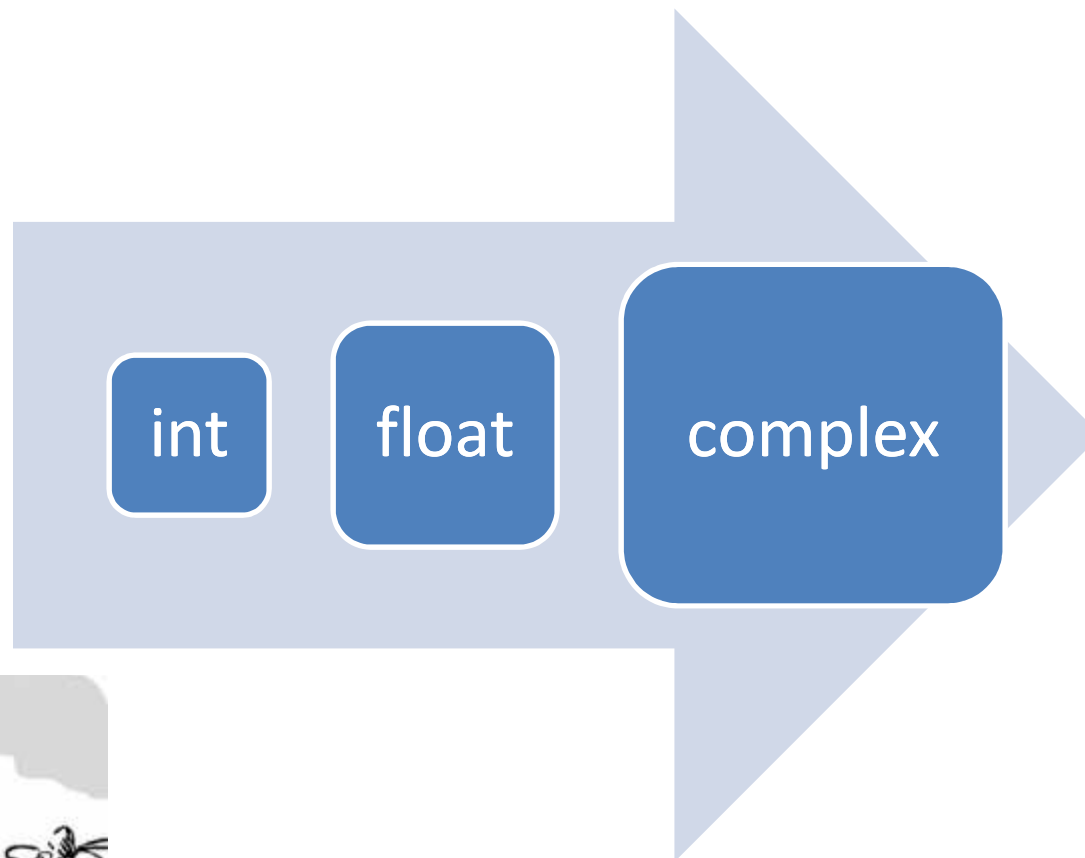
```
fs = frozenset([2, 3, 4])  
type(fs)
```



از نگاهی دیگر



تبدیل



<u>Function</u>	<u>Description</u>	<u>Function</u>	<u>Description</u>
int(x [,base])	<i>Converts x to an integer. base specifies the base if x is a string.</i>	set(s)	<i>Converts s to a set.</i>
long(x [,base])	<i>Converts x to a long integer. base specifies the base if x is a string.</i>	dict(d)	<i>Creates a dictionary. d must be a sequence of (key,value) tuples.</i>
float(x)	<i>Converts x to a floating-point number.</i>	frozenset(s)	<i>Converts s to a frozen set.</i>
complex(real [,imag])	<i>Creates a complex number.</i>	chr(x)	<i>Converts an integer to a character.</i>
str(x)	<i>Converts object x to a string representation.</i>	unichr(x)	<i>Converts an integer to a Unicode character.</i>
repr(x)	<i>Converts object x to an expression string</i>	ord(x)	<i>Converts a single character to its integer value.</i>
eval(str)	<i>Evaluates a string and returns an object.</i>	hex(x)	<i>Converts an integer to a hexadecimal string.</i>
tuple(s)	<i>Converts s to a tuple.</i>	oct(x)	<i>Converts an integer to an octal string.</i>
list(s)	<i>Converts s to a list.</i>		

پایتون و سی

- اجرای پایتون در سی
- اجرای سی در پایتون

Bjarne Stroustrup

(He is well known for the creation and development of C++ programming language and currently holds the college of engineering chair in computer science at Texas A&M.)



ctypes type	C type	Python type
<code>c_bool</code>	<code>_Bool</code>	<code>bool</code> (1)
<code>c_char</code>	<code>char</code>	1-character bytes object
<code>c_wchar</code>	<code>wchar_t</code>	1-character string
<code>c_byte</code>	<code>char</code>	<code>int</code>
<code>c_ubyte</code>	<code>unsigned char</code>	<code>int</code>
<code>c_short</code>	<code>short</code>	<code>int</code>
<code>c_ushort</code>	<code>unsigned short</code>	<code>int</code>
<code>c_int</code>	<code>int</code>	<code>int</code>
<code>c_uint</code>	<code>unsigned int</code>	<code>int</code>
<code>c_long</code>	<code>long</code>	<code>int</code>
<code>c_ulong</code>	<code>unsigned long</code>	<code>int</code>
<code>c_longlong</code>	<code>__int64</code> or <code>long long</code>	<code>int</code>
<code>c_ulonglong</code>	<code>unsigned __int64</code> or <code>unsigned long long</code>	<code>int</code>
<code>c_size_t</code>	<code>size_t</code>	<code>int</code>
<code>c_ssize_t</code>	<code>ssize_t</code> or <code>Py_ssize_t</code>	<code>int</code>
<code>c_float</code>	<code>float</code>	<code>float</code>
<code>c_double</code>	<code>double</code>	<code>float</code>
<code>c_longdouble</code>	<code>long double</code>	<code>float</code>
<code>c_char_p</code>	<code>char *</code> (NUL terminated)	bytes object or <code>None</code>
<code>c_wchar_p</code>	<code>wchar_t *</code> (NUL terminated)	string or <code>None</code>
<code>c_void_p</code>	<code>void *</code>	<code>int</code> or <code>None</code>

تعریف متغیرهای سی

```
import ctypes  
  
x=ctypes.c_int64()  
type(x)
```



Guido van Rossum

{He is well known as the author of Python programming language and is currently employed by Google}

تمرین

- برنامه ای بنویسید که متن یک نامه را کد گذاری کند به طوری که قابل خواندن نباشد.

```
x="Pedram"
print(x[0][0][0][0][0])
```

```
x=[1,2,3]
print(x[0][0])
```

```
x=[[1]*5]*3
print(x)
x[0][2]="X"
print(x)
```

- عبارت های مقابل را بررسی

```
List=[ '00','01','02','03','04',
        '10','11','12','13','14' ]
```

- بدون تغییر ساختار لیست؛ راه حلی برای رفتار با یک
ارایه ای چند-بعدی بیابید.

- عبارت های مقایسه ای را در مورد لیست ، دیکشنری ، تاپل و مجموعه بررسی کنید.

- درج، حذف و اپدیت را در لیست ، دیکشنری ، تاپل و مجموعه بررسی کنید.
- عملیات ریاضی (جمع، ضرب، تقسیم، درصد) را در لیست ، دیکشنری ، تاپل و مجموعه بررسی کنید.

```
x="python"
x=x[::-5]
y=x[1]
y=ord(y)-10
y=chr(y)
x=x[0]+y
```

- حاصل x در عبارت مقابل چیست

```
text=""

My little brother and I didn't know about your existence until I was 12 and he was 10.
Despite being the youngest,
he was the one who pieced together the omissions and
the half-truths to discover that we weren't each one of two siblings,
but two of four.

'''

char1 , char2 ,char3 , char4='i','a','t',' '
text=text.replace(char1,str(ord(char1)))
text=text.replace(char2,str(ord(char2)))
text=text.replace(char3,str(ord(char3)))
text=text.replace(char4,str(ord(char4)))
print(text)
```

R**Y****K****A** | **CBT**