Python, základní kameny až skály I

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platnost proměnných

```
1  W = 'to co je zde je viditelne vsude'
2  a = 'definovano v hlavnim programu'
3
4  def my_function(x):
5      a = 'definovano uvnitr funkce'
6      print('W je znamo: ',W)
7      return x + ' ' + a
8
9  # toto se vykona vzdy (import nebo beho programu)
10 print(a)
11
12 if __name__ == "__main__":
13     # toto se pri importu nevykona
14     a = 'neco jineho'
15     b = my_function(a)
```

visualizace

program structure - basic blocks

```
 1 import math
 2
 3 class MyClass:
 4     '''class for '''
 5     def __init__(self):
 6         '''MyClass constructor'''
 7         pass # nothing at the moment
 8
 9 def my_function(a,b):
10     '''compute sum a+b'''
11     pass # nothing at the moment
12
13 if __name__ == "__main__":
14     # actual program starts here
15     c = MyClass() # don't forget the parantheses! I will show!
16
```

imports

Definitions:
classes
functions

main program

V krátkých ukázkách budeme někdy ukazovat jen kód bez hlaviček a spol.

funkce vs. metoda

```
1  import math
2
3  class MyClass:
4      '''class for '''
5      def __init__(self):
6          '''MyClass constructor'''
7          pass # nothing at the moment
8      def my_class_method(self):
9          print('nothing to report')
10
11
12 def my_function(a,b):
13     '''compute sum a+b'''
14     pass # nothing at the moment
15
16 if __name__ == "__main__":
17     # actual program starts here
18     c = MyClass() # don't forget the parantheses! I will show!
19     c.my_class_method()
20
```

není číslo jako číslo

```
1 a = 0.1
2 b = 0.3
3 c = 3*a
4 if (b==c):
5     print(b,'and',c,'are equal')
6 else:
7     print(b,'and',c,'are NOT equal')
```

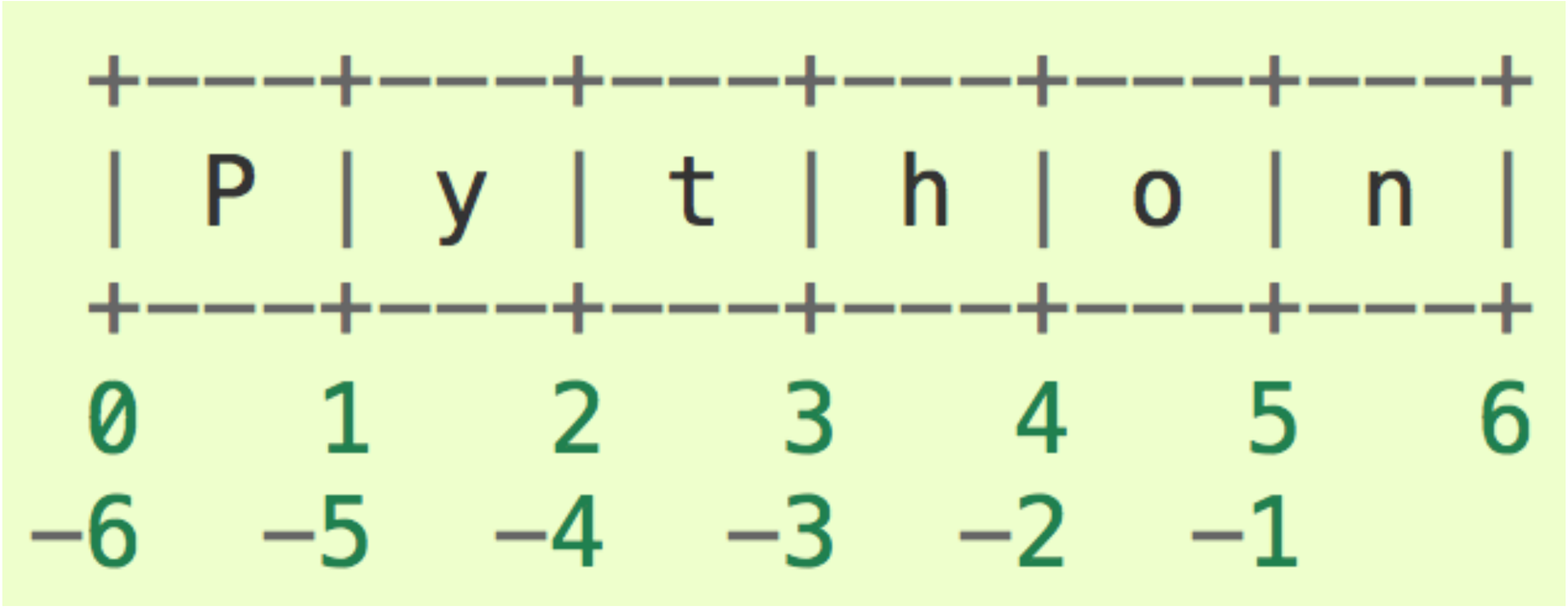
- vizualizace
- https://docs.python.org/3/tutorial/floatingpoint.html
- http://floating-point-gui.de/formats/binary/
- opatrnost při testování rovnosti (float) čísel
- pokud opravdu potřeba: `abs(a-b) < threshold`

řetězce neboli stringy

```
1  a = 'ahoj'
2  b = 'svete'
3  c = a+b
4  for i,item in enumerate(c):
5      print(i,'-',item)
6  banner = ['ahoj','svete']
7  for i,item in enumerate(banner):
8      print(i,'-',item)
9  for i,item in enumerate(banner):
10     for j,elem in enumerate(item):
11         print(i,'-',item,'***',j,':',elem)
```

visualizace

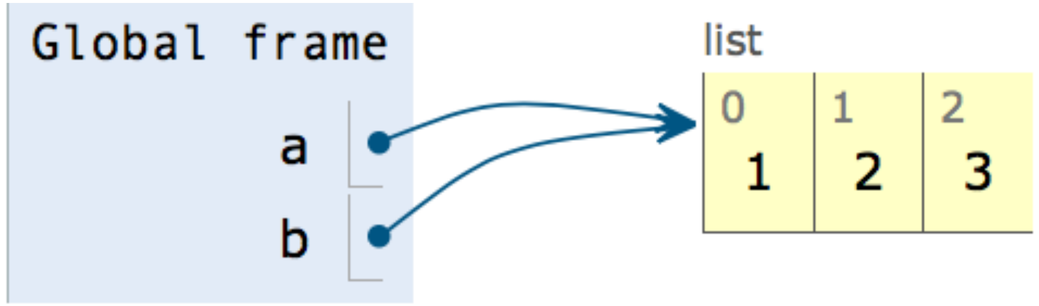
python indexing, slicing, …



dokončeme teď R-P-S
lepší hráč, s pamětí

pointers

```
1  a = [1,2,3]
2  b = a
3
```



visualisation

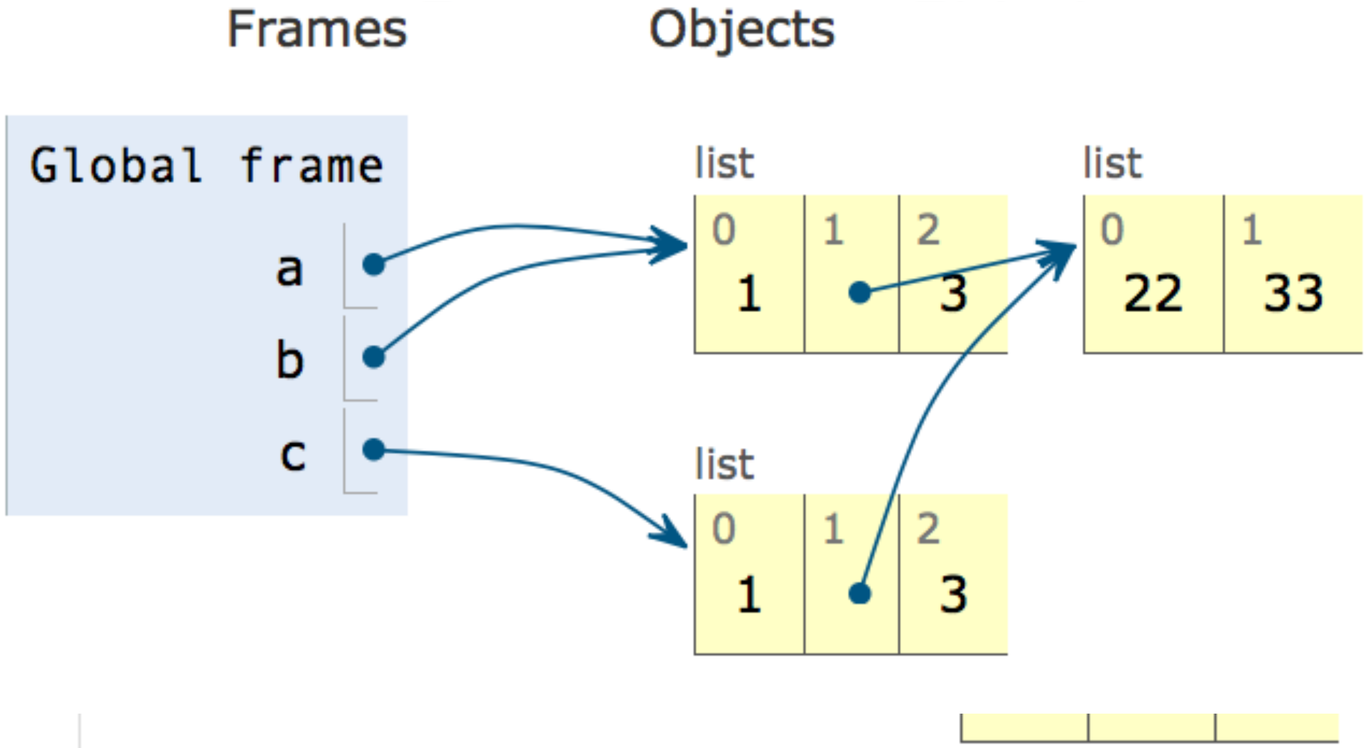
`is` vs `==`

making copy, a[:], rychle, ale ...

Write code in Python 3.3

(drag lower right corner to resize code editor)

```
1  a = [1,[22,33],3]
2  b = a
3  c = a[:]
4
5
```



`import copy` and go deep

http://docs.python.org/3.4/library/copy.html

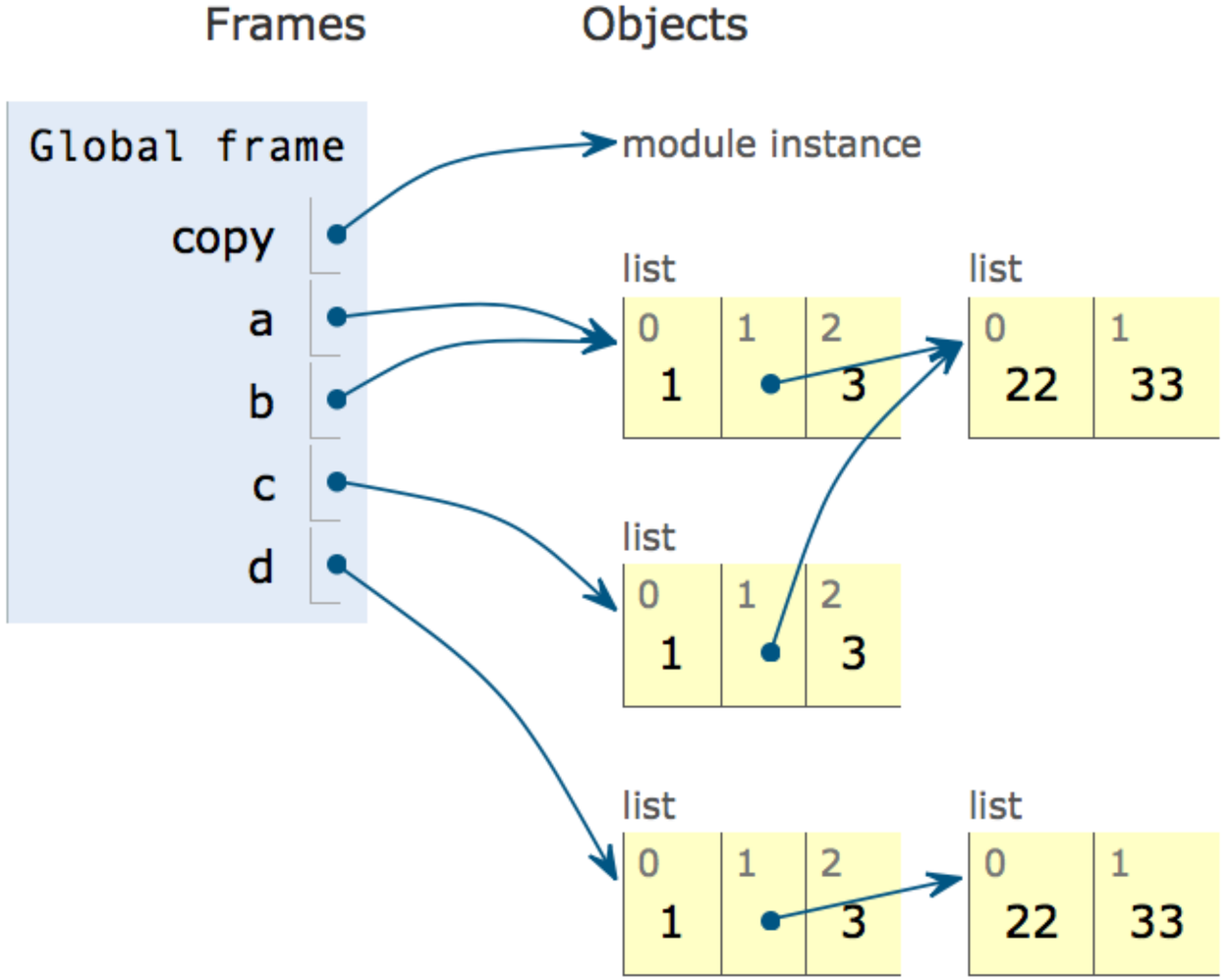
Write code in Python 3.3

(drag lower right corner to resize code editor)

```
1  import copy
2  a = [1,[22,33],3]
3  b = a
4  c = a[:]
5  d = copy.deepcopy(a)
6
7
```

line that has just executed

next line to execute

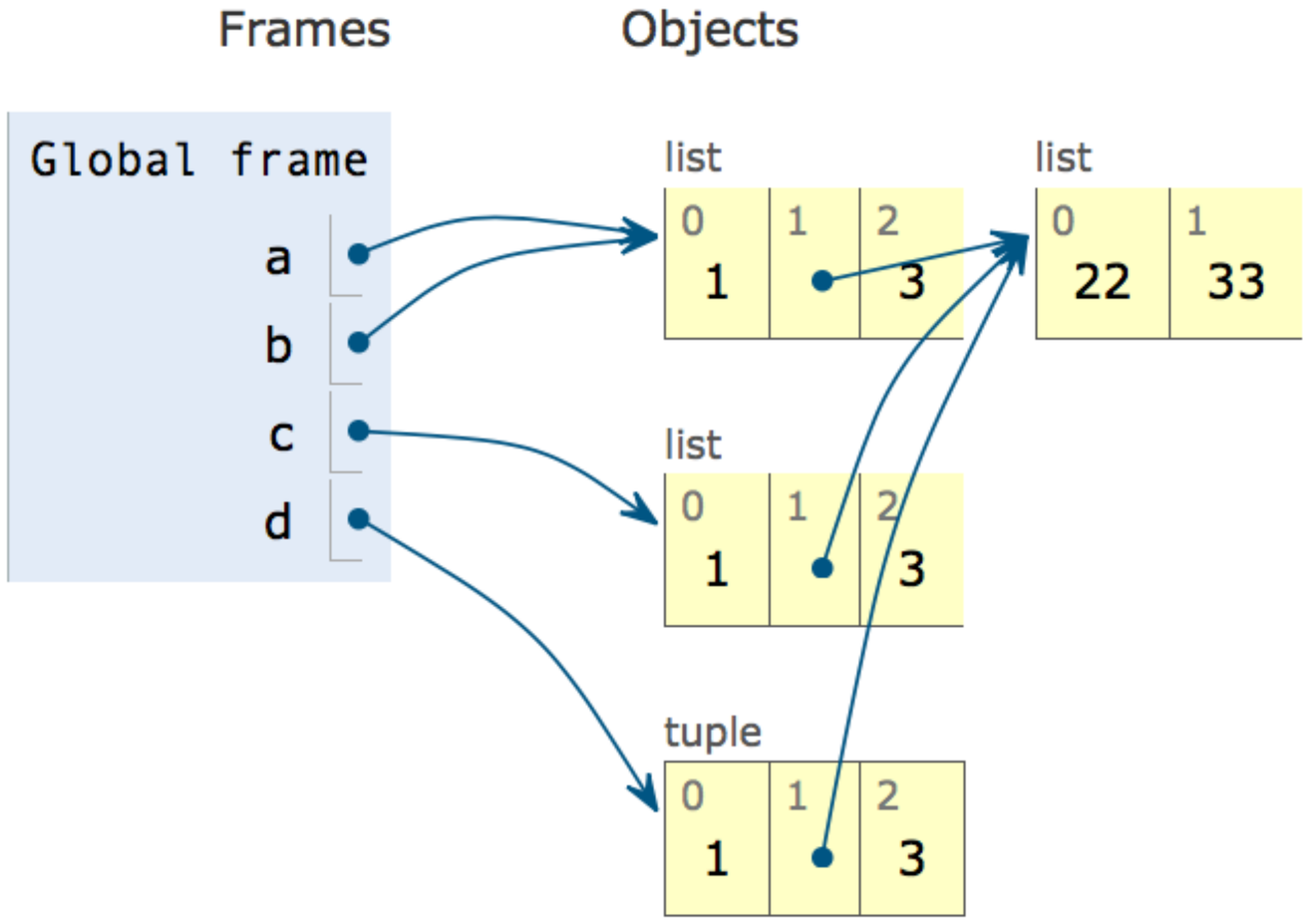


pozor na mělkost kopií

Write code in Python 3.3

(drag lower right corner to resize code editor)

```
1  a = [1,[22,33],3]
2  b = a
3  c = list(b)
4  d = tuple(a)
5
```



funkce pravé a modifikátory

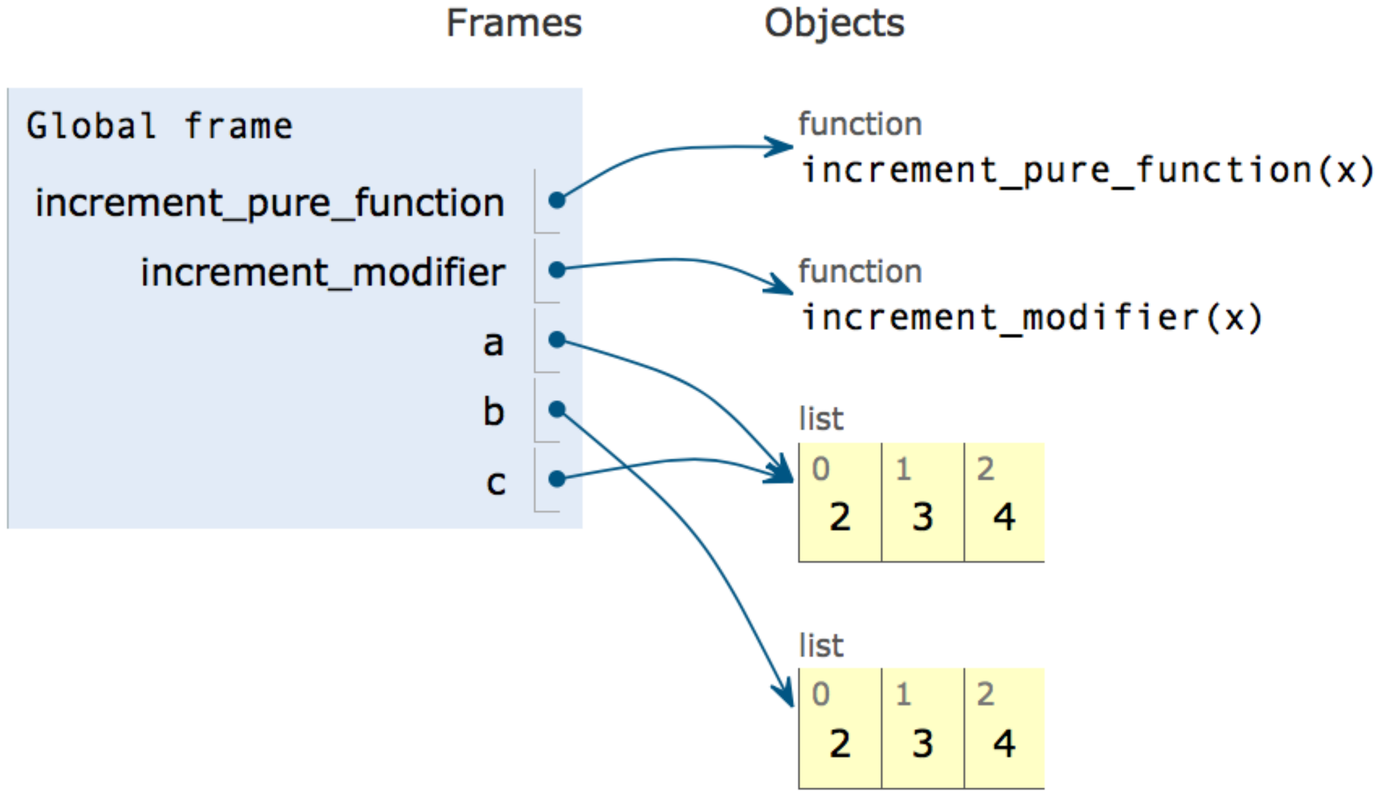
Write code in Python 3.3

(drag lower right corner to resize code editor)

```
1  def increment_pure_function(x):
2      v = []
3      for item in x:
4          v.append(item+1)
5      return(v)
6
7  def increment_modifier(x):
8      for i in range(len(x)):
9          x[i] = x[i]+1
10     return(x)
11
12 a = [1,2,3]
13 b = increment_pure_function(a)
14 print(a,',',b)
15 c = increment_modifier(a)
16 print(a,',',b,',',c)
```

Print output (drag lower right corner to resize)

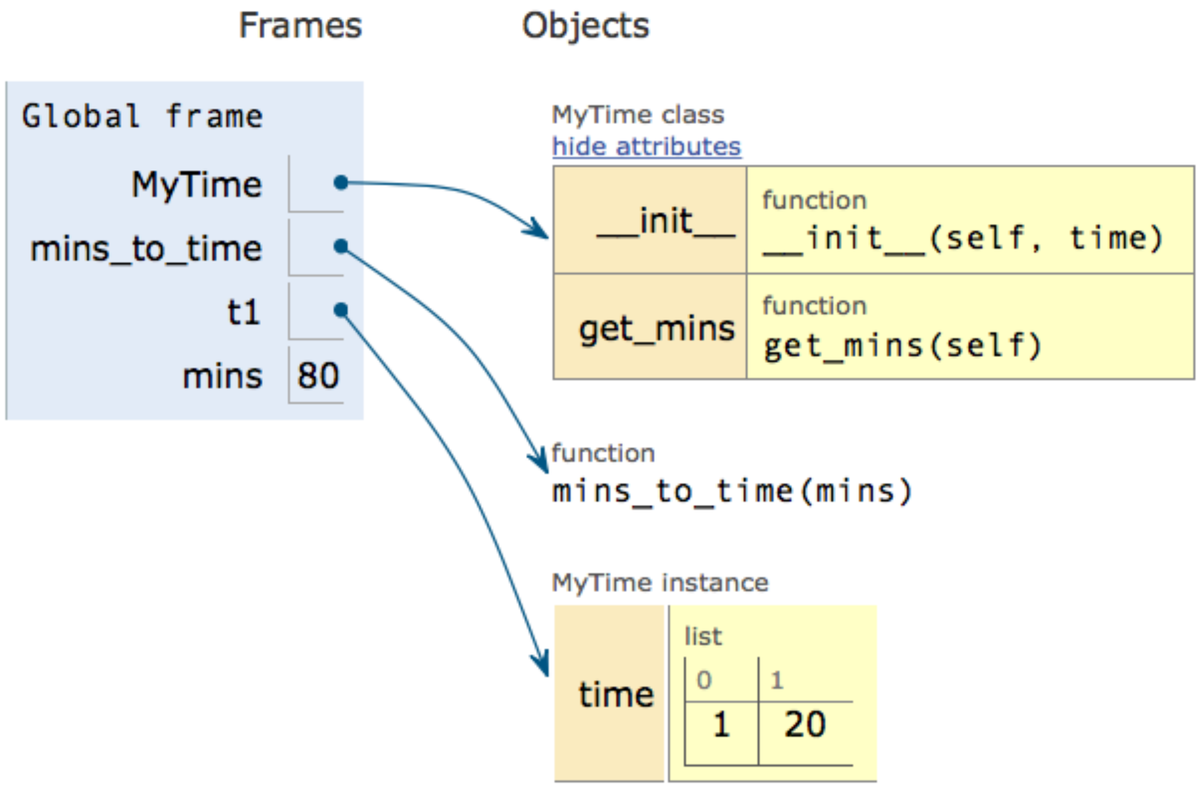
```
[1, 2, 3] , [2, 3, 4]
[2, 3, 4] , [2, 3, 4] , [2, 3, 4]
```



objekty, třídy a tak

Write code in Python 3.3 (drag lower right corner to resize code editor)

```
1  class MyTime:
2      def __init__(self,time=None):
3          self.time = time
4
5      def get_mins(self):
6          return(self.time[0]*60+self.time[1])
7
8  def mins_to_time(mins):
9      return([mins//60,mins%60])
10
11 t1 = MyTime([1,20])
12 mins = t1.get_mins()
13 time_vec = mins_to_time(mins)
```



visualisation

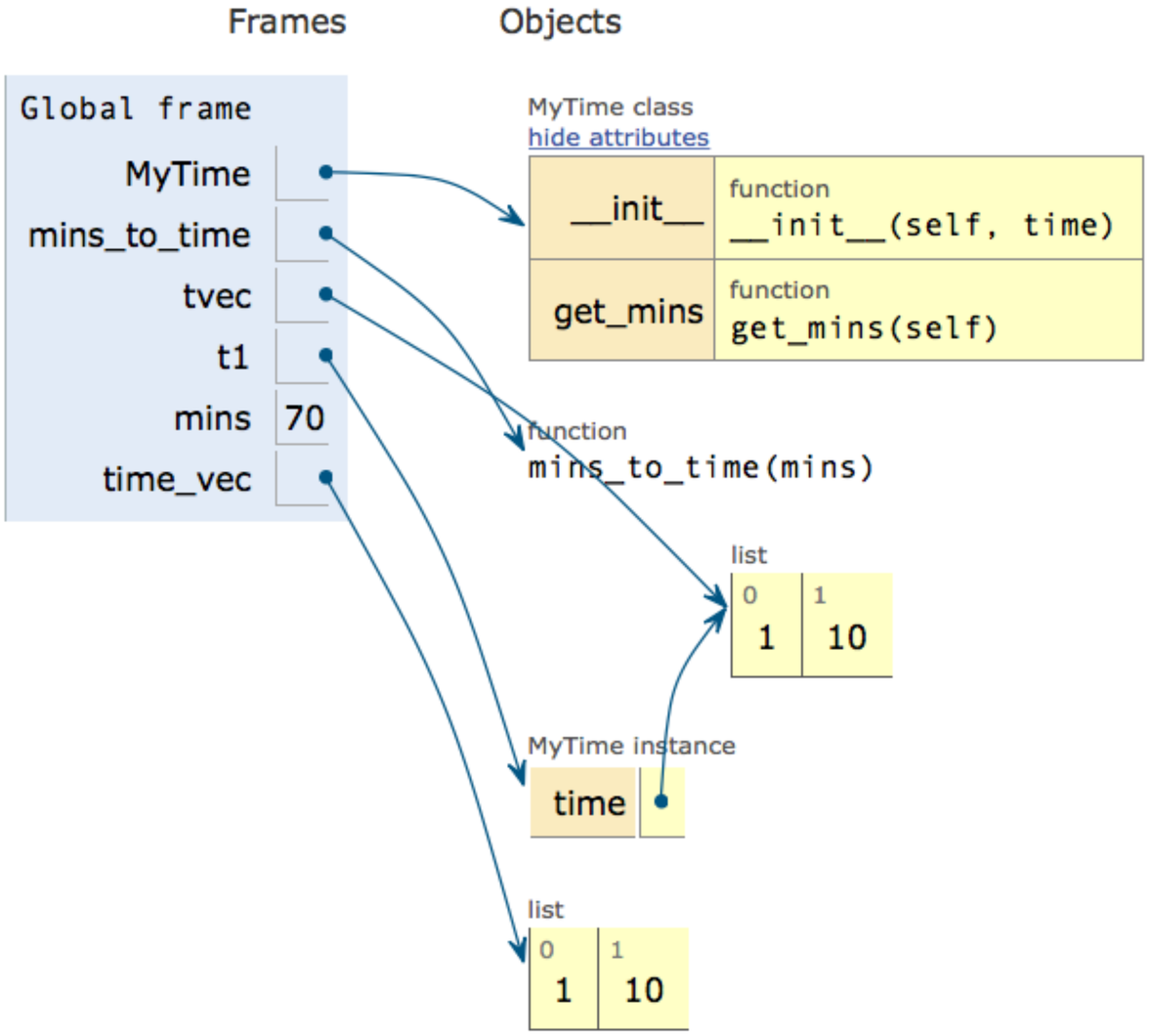
ale pozor …

Write code in Python 3.3 (drag lower right corner to resize code editor)

```
1  class MyTime:
2      def __init__(self,time=None):
3          self.time = time
4
5      def get_mins(self):
6          return(self.time[0]*60+self.time[1])
7
8  def mins_to_time(mins):
9      return([mins//60,mins%60])
10
11 tvec = [1,20]
12 t1 = MyTime(tvec)
13 tvec[1] = 10
14 mins = t1.get_mins()
```

line that has just executed
next line to execute

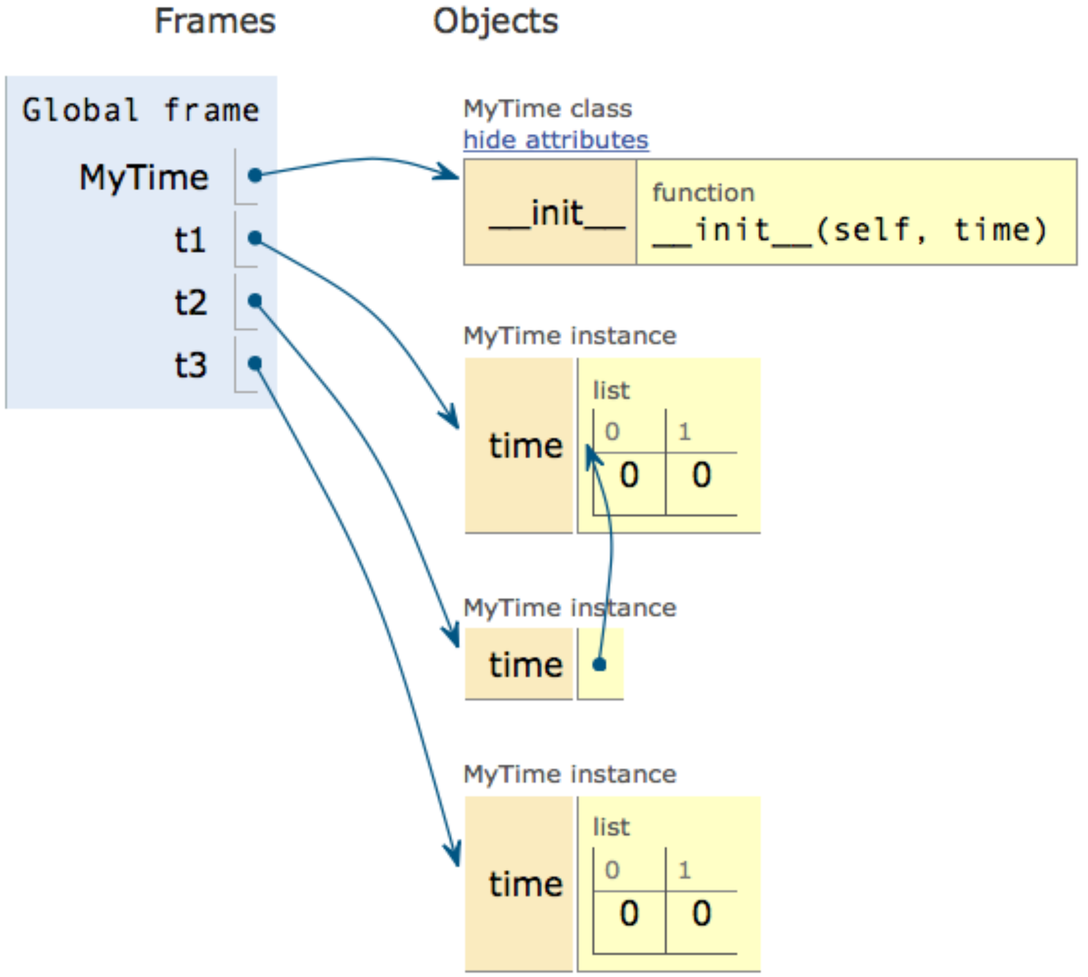
<< First | < Back | Done running (16 steps) | Forward > | Last >>



a ještě větší pozor na implicitní parametry

Write code in Python 3.3 (drag lower right corner to resize code editor)

```
1  class MyTime:
2      def __init__(self,time=[0,0]):
3          self.time = time
4
5  t1 = MyTime()
6  t2 = MyTime()
7
8  t3 = MyTime([0,0])
9
```



implicitní parametry detailněji

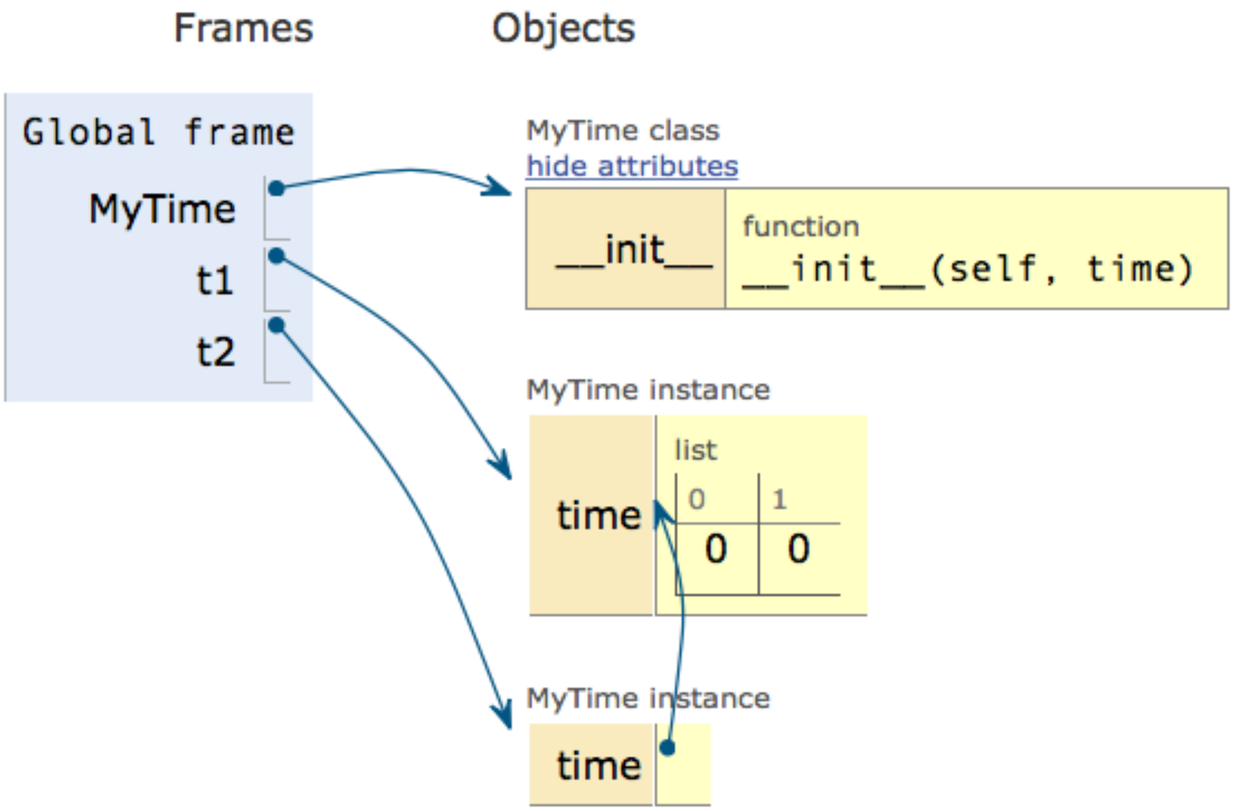
Write code in Python 3.3

(drag lower right corner to resize code editor)

```
1  class MyTime:
2      def __init__(self,time=[0,0]):
3          self.time = time
4
5  t1 = MyTime()
6  t2 = MyTime()
7  print(id(t1.time))
8  print(id(t2.time))
9  print(t1.time is t2.time)
10
```

Print output (drag lower right corner to resize)

```
140145092713432
140145092713432
True
```



běžte a programujte!

- http://pythontutor.com/visualize.html#mode=edit
- http://openbookproject.net/thinkcs/python/english3e/index.html