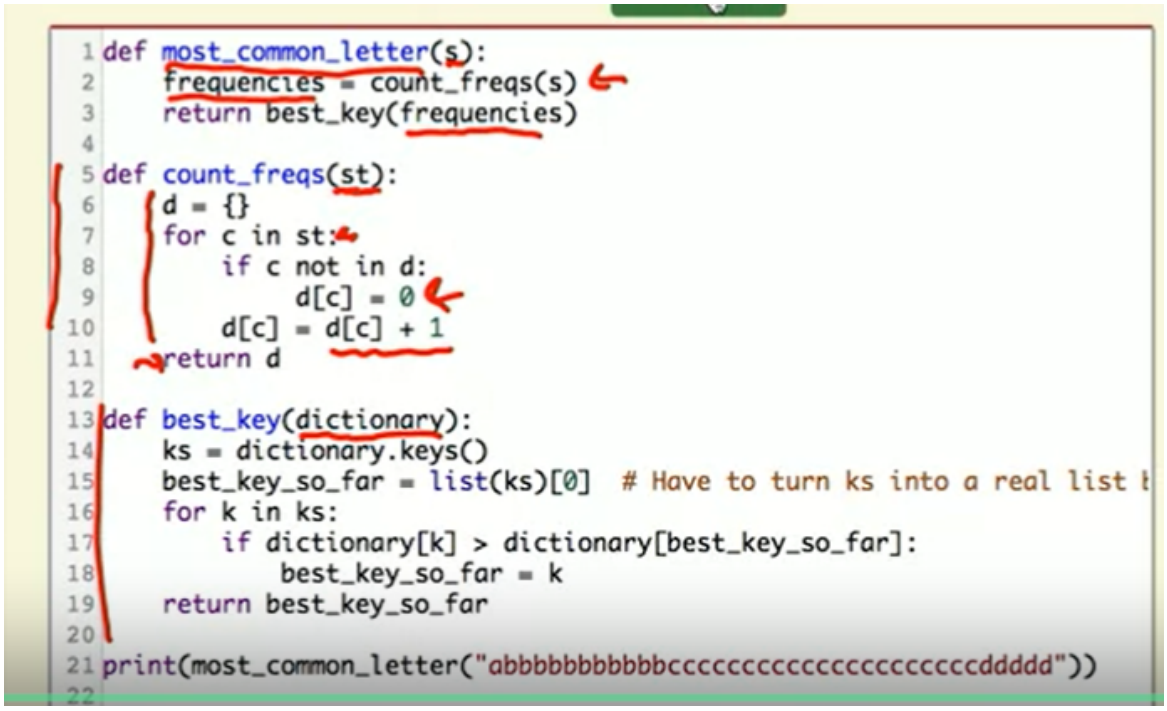
2.3 Function Files Dictionaries

- Function
  - defining functions：A named sequence of statements.
    - 用def
      - def hello():
      - """This function says hello and greets you"""
      - print("Hello")
      - print("Glad to meet you")
      - hello()
      - 输出
      - Hello
      - Glad to meet you
    - 一定要有冒号和缩进！用三引号因为可以跨行代码
      - print(type(hello))
      - 输出 <class 'function'>
  - positional parameter passing
    - 有另外的variable在括号中 叫formal parameter 或者parameter names input parameters
      - 1 def hello2(s):
      - 2 print("Hello " + s)
      - 3 print("Glad to meet you")
      - 4
      - 5 hello2("Iman") "Iman"就是parameter value
      - 6 hello2("Jackie")
      - 如果 hello2("Class " * 3)
      - 输出
      - Hello Class Class Class
      - Glad to meet you
    - 如果是两个变量的话
      - 1 def hello3(s, n):
      - 2 greeting = "Hello {} ".format(s)
      - 3 print(greeting*n)
      - 4

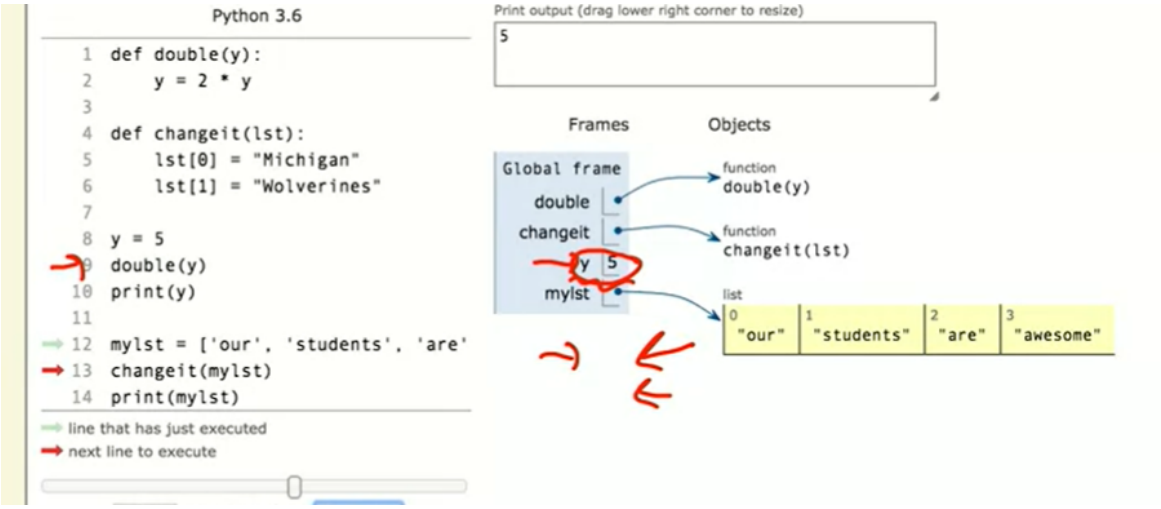
        - 5 hello3("Wei", 4)
        - 6 hello3("", 1)
        - 7 hello3("Kitty", 11)
        - 输出是Hello Wei重复4遍 Hello Kitty重复11遍
    - 例子
        - def cyu(s1, s2):
        - if len(s1) > len(s2):
        - print(s1)
        - cyu("Hello", "Goodbye")
        - print(s2)
        - else:
        - 输出Goodbye
- Returning Values
    - 例子
        - def square(x):
        - y = x * x
        - return y
        - toSquare = 10
        - result = square(toSquare)
        - print("The result of {} squared is {}.".format(toSquare, result))
        - 定义了一个square function 是y=x*x 然后要return y值；定义toSquare是10，然后result=... 所以相当于result=square(10)带入square方程 returny值是100 再打印format代入句子
        - 如果不return的话 result就会是None 一旦return了之后 如果冒号底下return后面还有需要运作的东西就不会继续下去了 就直接会运行其他的代码
        - return其实是个function
    - y = x * x
    - return y
    - toSquare = 10
    - result = square(toSquare)
    - print("The result of {} squared is {}.".format(toSquare, result))
- a function that accumulates
    - function中包含function
        - def total(lst):
        - tot=0
        - for num in lst:

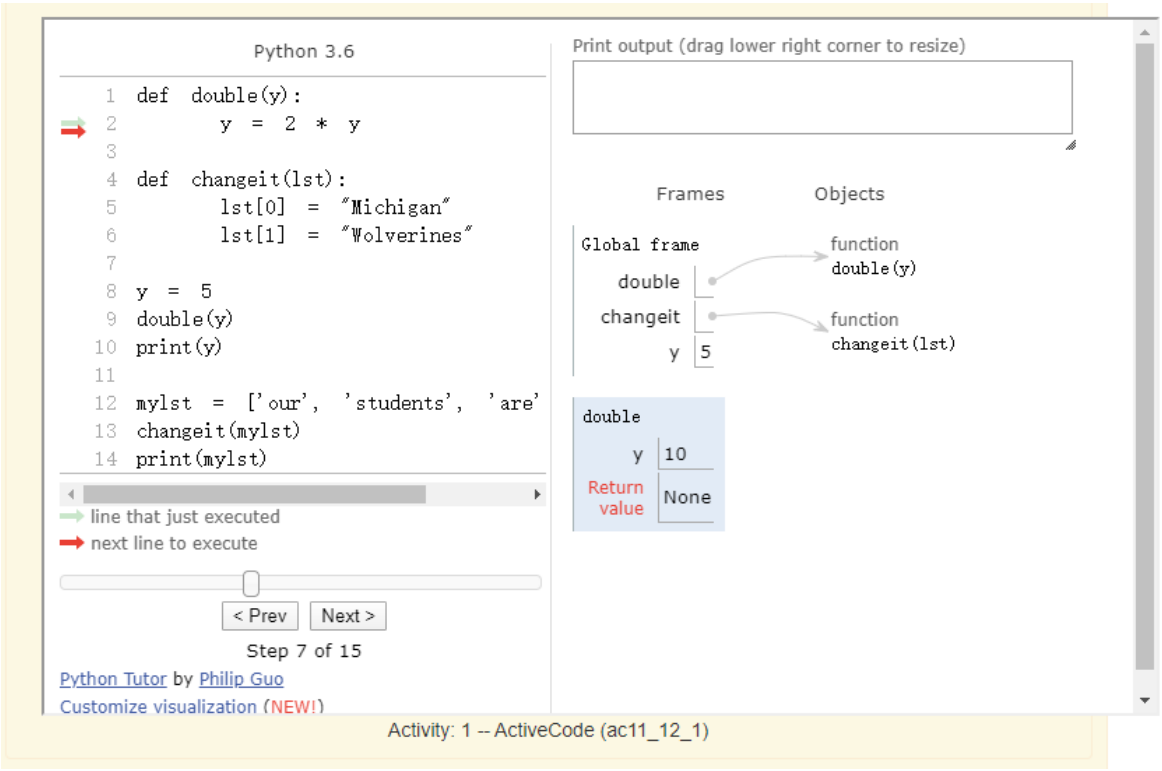
        - tot=tot+num
        - return tot
    - y=tot([1,5,7)]
    - print(y)
- function composition 组合
    - 给每个char赋值并找到最多的那个



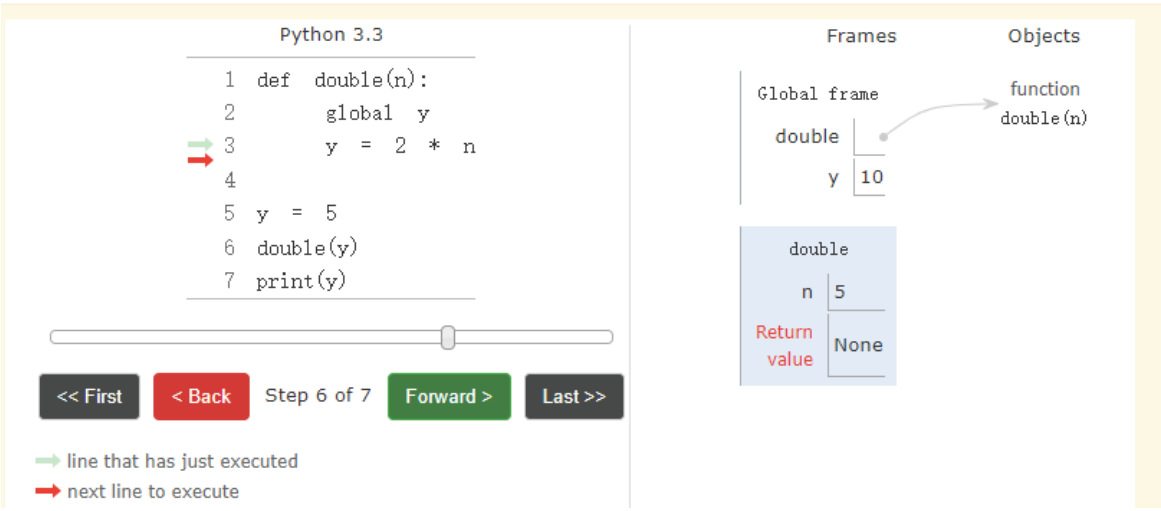
```
def most_common_letter(s):
    frequencies = count_freqs(s)
    return best_key(frequencies)

def count_freqs(st):
    d = {}
    for c in st:
        if c not in d:
            d[c] = 0
        d[c] = d[c] + 1
    return d

def best_key(dictionary):
    ks = dictionary.keys()
    best_key_so_far = list(ks)[0]  # Have to turn ks into a real list t
    for k in ks:
        if dictionary[k] > dictionary[best_key_so_far]:
            best_key_so_far = k
    return best_key_so_far

print(most_common_letter("abbbbbbbbbbbccccccccccccccccccccddddd"))
```

    - 拿到问题的时候要decompose 问题 首先要拆解 然后分开编function
    - 就算第二行中的count_freq(s)在之前没有被定义 但是它是inside function的 所以没关系
- mutable objects and side effects
    - 如果 function makes a change to immutable object like a list or a dictionary一个函数对不可变的对象比如说list or dictionary更改
    - 这里是说y=5但是 是global的 你对local怎么定义y的值并不影响global的值是5 所以这个print y出来的不是10而是5这里的local y和global y不是同一个东西 只不过恰好value一样

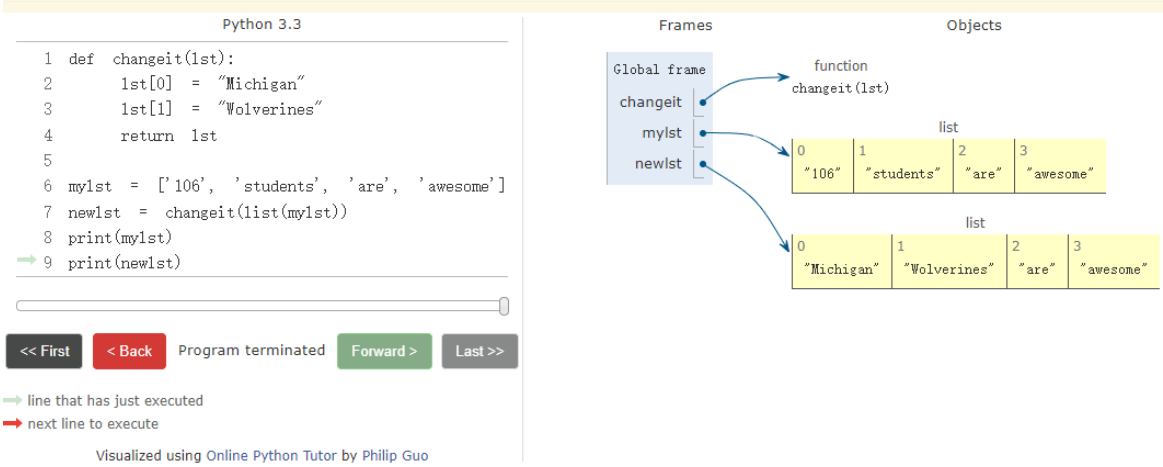




- 上图进行到这里的时候 return value是None
- variable是local的 但是objects不是 所以上面的例子就是 running double并没有change y但是running changeit却change了mylst 因为objects share了mutable objects
- 所以changeit这个function就是有side effect 他change了像list dic这样不变的东西
- 像这样就是change了global的y了



- 这样就不会change自己list的东西



- Tuple
  - tuple packing
    - julia = ("Julia", "Roberts", 1967, "Duplicity", 2009, "Actress", "Atlanta, Georgia")和julia = "Julia", "Roberts", 1967, "Duplicity", 2009, "Actress", "Atlanta, Georgia"是一样的
    - 只要python期望一个值，如果提供了多个表达式，用逗号分隔，它们就会自动打包成一个tuple。
    - 例子
      - def circleInfo(r):
      - """ Return (circumference, area) of a circle of radius r """
      - c = 2 * 3.14159 * r
      - a = 3.14159 * r * r
      - return (c, a)和return c,a一样的效果 python都会自动识别输出(,)
      - print(circleInfo(10))
      - 输出(62.8318, 314.159)
      -

- tuple unpacking
  - 例子
    - julia="Julia", "Roberts",1967,"Duplicity",2009,"Actress","Atlanta,Georgia"
    - name, birth_year, movie,movie_year,profession,birth_place=julia
    - 后面这句话的意思就是 name=julia[0] surname=julia[1]...
  - 例子
    - a = 1
    - b = 2
    - (a, b) = (b, a)
    - print(a, b)
    - 输出2 1
  - 例子
    - authors = [('Paul', 'Resnick'), ('Brad', 'Miller'), ('Lauren', 'Murphy')]
    - for first_name, last_name in authors:
    - print("first name:", first_name, "last name:", last_name)
    - 输出
    - first name: Paul last name: Resnick
    - first name: Brad last name: Miller
    - first name: Lauren last name: Murphy
    - On the first iteration the tuple ('Paul', 'Resnick') is unpacked into the two variables first_name and last_name.

- emurate枚举法
  - fruits = ['apple', 'pear', 'apricot', 'cherry', 'peach']
  - for n in range(len(fruits)):
  - print(n, fruits[n])
  - 输出结果和
  - fruits = ['apple', 'pear', 'apricot', 'cherry', 'peach']
  - for item in enumerate(fruits):
  - print(item[0], item[1]) 一样
  - 和
  - fruits = ['apple', 'pear', 'apricot', 'cherry', 'peach']
  - for idx, fruit in enumerate(fruits):
  - print(idx, fruit)一样
  - 都是
  - 0 apple
  - 1 pear
  - 2 apricot
  - 3 cherry
  - 4 peach
- v1,v2,v3,v4=1,2,3,4就是一行让每个互相对应的例子
- 例子 items把dic转换为tuple
  - pokemon = {'Rattata': 19, 'Machop': 66, 'Seel': 86, 'Volbeat': 86, 'Solrock': 126}
  - a=pokemon.items()
  - p_names=[]
  - p_number=[]
  - for name,num in a:
  - p_names=p_names+[name]
  - p_number=p_number+[num]
- 不会的

The .items() method produces a sequence of key-value pair tuples. With this in mind, write code to create a list of keys from the dictionary `track_medal_counts` and assign the list to the variable name `track_events`. Do **NOT** use the .keys() method.

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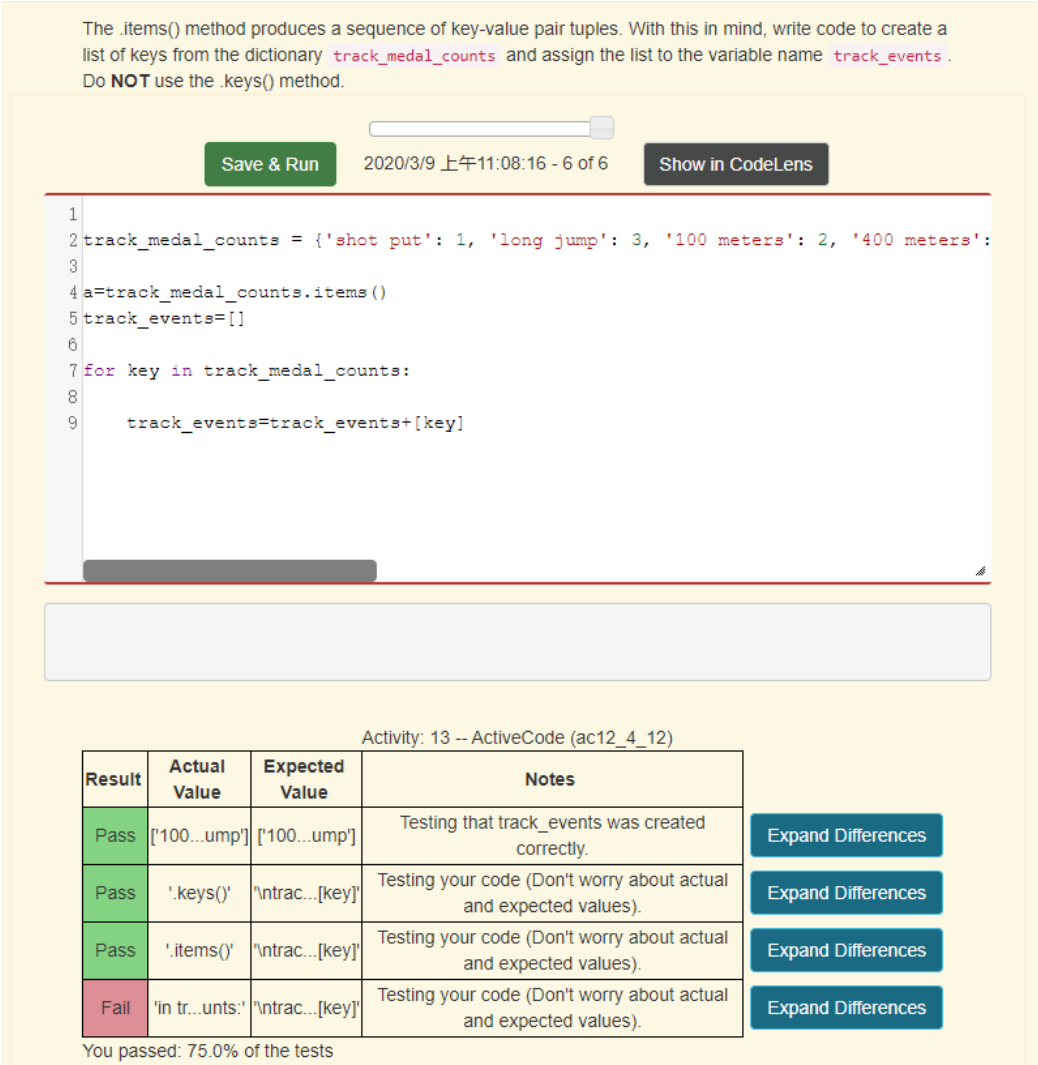
```
1
2 track_medal_counts = {'shot put': 1, 'long jump': 3, '100 meters': 2, '400 meters':
3
4 a=track_medal_counts.items()
5 track_events=[]
6
7 for key in track_medal_counts:
8
9     track_events=track_events+[key]
```

Activity: 13 -- ActiveCode (ac12_4_12)

Result	Actual Value	Expected Value	Notes	
Pass	['100...ump']	['100...ump']	Testing that track_events was created correctly.	Expand Differences
Pass	'.keys()'	'\ntrac...[key]'	Testing your code (Don't worry about actual and expected values).	Expand Differences
Pass	'.items()'	'\ntrac...[key]'	Testing your code (Don't worry about actual and expected values).	Expand Differences
Fail	'in tr...unts:'	'\ntrac...[key]'	Testing your code (Don't worry about actual and expected values).	Expand Differences

You passed: 75.0% of the tests

- 例子
  - def add(x, y):

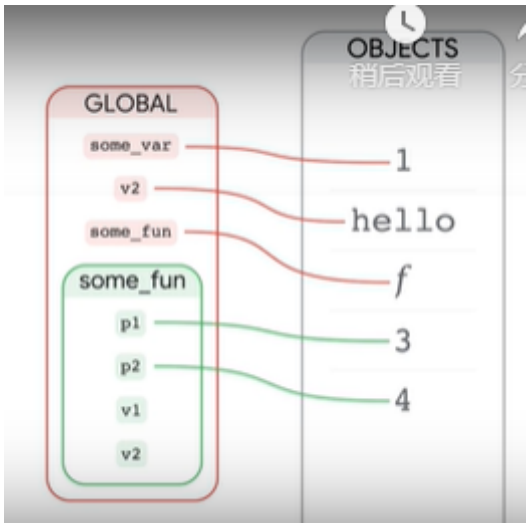


- return x + y
- print(add(3, 4))
- z = (5, 4)
- print(add(z)) # this line causes an error因为会把z当成一个变量而不是一个tuple
- 需要在z前加一个*print(add(*z)) 让python认出来z是一个tuple

- 例子
  -

- Variables
  - variable scoping and side effects
    - local and globle variable
      - scope就是python查找的范围?
      - python space有两种
        - 一种是 name space
          - built-in scope 本来就有的 像print len这种function
          - global scope 比如我们自己弄的function
          - local scope 我们自己assign的variable

- 一种是 object space
- 举个例子
  - some_var=1
  - 其实是create一个some_var在global scope 然后link这个some_var去objects space的1
  - 又比如我要弄一个some_fun(p1,p2) function 同时给了3和4这两个值：然后会马上有v1和v2两个local值创立 之后自己又会自动消失 每次python找东西都会先去local 再global

  - 如果v2存在both local and global python会自动去local里链接而不会去global里
- 找local：A temporary variable that is only used inside a function
  - numbers = [1, 12, 13, 4]
  - def foo(bar):
  - aug = str(bar) + "street"
  - return aug
  - addresses = []
  - for item in numbers:
  - addresses.append(foo(item))
  - local是bar 和 aug