Using Lists with Functions

- We know that when we pass arguments to functions, the function gets a local copy of the value passed in. These local copies are called **parameters** or **local parameters**. We can modify the local copy in the function but those changes cannot be seen outside of the function.
- There is an exception to that rule and that is when data structures such as lists, sets and dictionaries are used as arguments.

Example:

```
##
#  This program reads, scales and reverses a sequence of scores.
#

def main() :
   scores = readFloats(5)
   multiply(scores, 10)
   print("\nReversed numbers: ")
   printReversed(scores)
```

You can modify lists

Yes, you can modify lists, but why is that?

Python passes a copy of the **memory address** of the list to function so you can change the values in the list. We'll see how that happens on the next page.

An analogy

You can think of this like having the number of a post office box. Everytime you want to look at or change the contents you use the reference number to find where the post office box is.

German Postbox by Eschweiler, from Wikimedia Commons

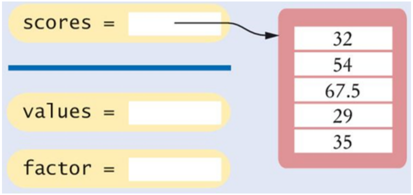
reverse.py

Take a look at program `reverse.py` in the src folder.

```
## reverse.py
## Multiplies all elements of a list by a factor.
#  @param values a list of numbers
#  @param factor the value with which element is multiplied
#
def multiply(values, factor) :
   for i in range(len(values)) :
      values[i] = values[i] * factor
```

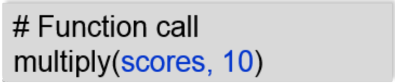
reverse.py

Before the call to function `multiply`, the variable `scores` contains the memory address for the list of numbers.



Function multiply()

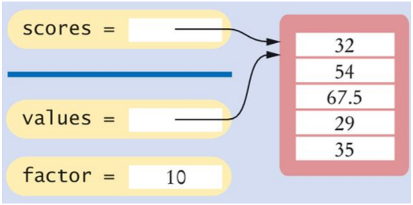
Function `multiply()` is called.



```
# Function call
multiply(scores, 10)
```

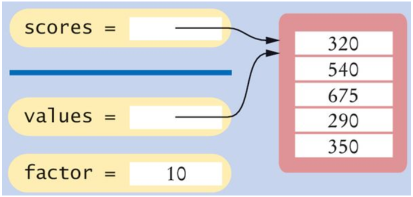
multiply()

After the function call, the local parameters are assigned values. The parameter `values` contains the address of the list and parameter `factor` contains the number 10.

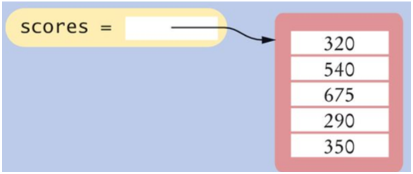


reverse.py

All the elements in the list are multiplied by 10.



When the function `multiply` ends, control returns back to the `main` method. The variable `scores` still contains a reference to the list.



Diagrams are taken from Chapter 6, Python for Everyone, 2nd Edition, C. Horstmann and R. Necaise.