



Programming 1

Laszlo SZATHMARY
University of Debrecen
Faculty of Informatics

Lecture #9

- advanced sorting
- exception handling

(last update: 2024-01-31 [yyyy-mm-dd])

2023-2024, 2nd semester

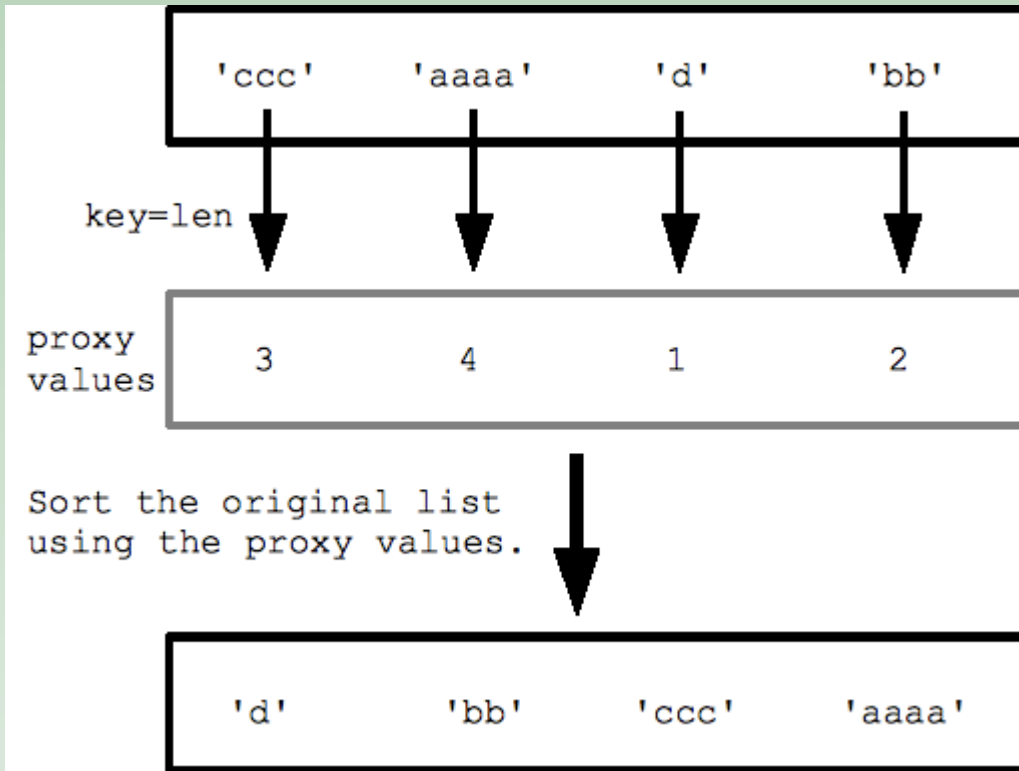


Advanced sorting

If you want to do some more complex sorting, you can provide a „key” parameter to the `sorted()` function. The value of the „key” parameter is another function. Before sorting, this function transforms the elements. The function takes a value and it returns a new value. Sorting is based on the values that are returned by the function.

```
1 >>> words = ['ccc', 'aaaa', 'd', 'bb']
2 >>> sorted(words)
3 ['aaaa', 'bb', 'ccc', 'd']
4 >>>
5 >>> sorted(words, key=len)
6 ['d', 'bb', 'ccc', 'aaaa']
```

Here, the value of „key” is the built-in „len” function. We want to sort the words by their lengths. The function `len` is called with each element of the list, and the sorting is done by the values returned by `len`.



from the values returned by „len” a proxy list („shadow list”) is constructed, and this proxy list is sorted:
[1, 2, 3, 4]

then replaced by the original values:
1 -> `'d'`
2 -> `'bb'`
3 -> `'ccc'`
4 -> `'aaaa'`

```
1 >>> words = ['Cc', 'BB', 'aa', 'zz']
2 >>> sorted(words)
3 ['BB', 'Cc', 'aa', 'zz']
4 >>>
5 >>> sorted(words, key=str.lower)
6 ['aa', 'BB', 'Cc', 'zz']
```

sort the words in *ignore-case* mode, i.e. no difference between lowercase and uppercase

```
1 >>> words = ['xc', 'zb', 'yd', 'wa']
2 >>> sorted(words)
3 ['wa', 'xc', 'yd', 'zb']
4 >>>
5 >>> def my_func(s):
6 ...     return s[-1]
7 ...
8 >>> sorted(words, key=my_func)
9 ['wa', 'zb', 'xc', 'yd']
```


sort the words by their last character

you can provide your own function

Exceptions

```
1  #!/usr/bin/env python3
2
3  import sys
4
5
6  def cat(fname):
7      f = open(fname, 'r')
8      text = f.read()
9      print('---', fname)
10     print(text)
11     f.close()
12
13     #####
14
15     if __name__ == "__main__":
16         args = sys.argv[1:]
17         for arg in args:
18             cat(arg)
```

this output is similar to
the output of the Unix
command `cat`



Exercise:

Produce a warning message if
a file doesn't exist, then
continue processing the next
argument.

see also <https://arato.inf.unideb.hu/szathmary.laszlo/pmwiki/index.php?n=EnPy3.20121120a>

```
6 def cat(fname):
7     try:
8         f = open(fname, 'r')
9         text = f.read()
10        print('---', fname)
11        print(text)
12        f.close()
13    except IOError:
14        print('--- I/O error:', fname)
```

Exception is caught and handled during runtime.

If the file doesn't exist: warning message and the program goes on.

```
6 def cat(fname):
7     try:
8         f = open(fname, 'r')
9         text = f.read()
10        print('---', fname)
11        print(text)
12        f.close()
13    except IOError as e:
14        print('--- I/O error:', e)
```

„e” is the exception object

print the exception object

You can catch different kinds of exceptions in an except branch. In this case the types of the exceptions must be grouped in a **tuple**.

```
except (KeyboardInterrupt, EOFError):
```



Exercise

Extend the script with exception handlers.

Link: <https://arato.inf.unideb.hu/szathmary.laszlo/pmwiki/index.php?n=EnPy3.20121120b>

Exercises



homework



1. [[20130920a](#)] swap case
2. [[20120904b](#)] reverse a part of a list
3. [[20130326a](#)] last N lines, version **B**