Lecture 12: Strings and File I/O

CS 51P   October 18, 2023

strings are sequences

```
string = "Hello world!"
```

- can:
  - loop over contents

```
for char in string:
    print(char)
```

  - check membership

```
check = "!" in string
```

  - get the length

```
length = len(string)
```

  - index into them

IndexError: range object index out of range

```
char = string[3]
char2 = string[12]
```

Two ways to process each char in a string

- 1. iterate over items

```
for char in string:
    print(char)
```

- 2. iterate based on index

```
for i in range(len(string)):
    print(string[i])
```

Example

- Define a function str_even that takes one parameter s (a string) and returns a string comprised of only the even characters of s

Exercise

- Define a function findchar that takes two parameters, a string s and a character c and returns the index of the first instance of that character. If that character does not appear in the string, it returns -1

- findchar("hello", "h") == 0
- findchar("hello", "l") == 2
- findchar("hello", "a") == -1

slicing (1)

- For extracting part of a sequence

```
s[:]
s[start:]
s[:end]
s[start:end]
```

```
>>> s = "Hello world!\n\n"
>>> s[6]
    'w'
>>> s[2:7]
    'llo w'
>>> s[5:]
    ' world!\n\n'
>>> s[:3]
    'Hel'
```

slicing (2)

- For extracting part of a sequence

```
s[:]
s[start:]
s[:end]
s[start:end]

s[start::step]
s[:end:step]
s[start:end:step]
```

```
>>> s = "Hello world!\n\n"
>>> s[2::2]
    'lowrd\n'
>>> s[1:10:3]
    'eoo'
>>> s[:5:2]
    'Hlo'
>>> s[-3:-10:-1]
    '!dlrow '
```

Exercise

- Evaluate the following expressions.

```
test = "This is a string"
```

- `test[10]`

- `test[0:2]`

- `test[:5]`

- `test[::2]`

String methods

```
from string import *

test = " This is a string"

1  test.startswith(" Thi")
2  test.startswith(" this")
3  test.endswith("a")
4  test.endswith("string")
5  test.lower()
6  test.strip()
7  test.strip("g")
8  test.find("i")
9  test.find(" is")
10 test.find("banana")
11 test.replace("s", "S")
12 test.replace("is", "si")
```

What is the value of test at the end?

files are also sequences

- a file is a sequence of strings
- … so we can use the keyword in to loop through the lines of a file!

```
file = open("filename.txt", "r")
for line in file:
        print(line)
file.close()
```

Reading and Writing Files

- reading from a file:

```
file_in = open("filename.txt", "r")
for line in file_in:
        # do something with each line
file_in.close()
```

- can use file_in.readline() to get one line at a time
- reading from a file keeps going from where it was

- writing to a file:

```
file_out = open("filename.txt", "w")
file_out.write("Line 1 in the file\n")
file_out.write("Next line in the file\n")
file_out.close()
```

Remember to close your files!

Example

- Define a function count_chars that takes on parameter filename and returns the number of characters in that file.

Exercise

- Define a function combine_files that takes three arguments (infile1, infile2, outfile), all of which are strings, and creates a new file named outfile whose contents are the contents of the file named infile1 followed by the contents of the file named infile2.

```
def example1(filename):
    s = 0

    file = open(filename, "r")
    for line in file:
        print(line)
    file.close()

    print(s)
```

- what if the file doesn't exist?

aside on lab/assignment

- Read before lab: "All I Really Need to Know about Pair Programming I Learned in Kindergarten": https://collaboration.csc.ncsu.edu/laurie/Papers/Kindergarten.PDF

- Think carefully about whether you want to work with a partner on this assignment. Since you can only work on the code when both of you are in the same physical location, you should think about when you'll want to work on the asignment and how much time you'll want to put in. Working with a partner is a commitment. Once you've checked in this lab, you may not change your mind about who you're working with, or whether you're working alone or in a pair.

- If you want to work in a pair, please try to find a partner for this assignment. Let the professors know if you'd like help finding someone to work with.