

Exercise 20: Functions and Files

Remember your checklist for functions, then do this exercise paying close attention to how functions and files can work together to make useful stuff.

```
1  from sys import argv
2
3  script, input_file = argv
4
5  def print_all(f):
6      print f.read()
7
8  def rewind(f):
9      f.seek(0)
10
11 def print_a_line(line_count, f):
12     print line_count, f.readline()
13
14 current_file = open(input_file)
15
16 print "First let's print the whole file:\n"
17
18 print_all(current_file)
19
20 print "Now let's rewind, kind of like a tape."
21
22 rewind(current_file)
23
24 print "Let's print three lines:"
25
26 current_line = 1
27 print_a_line(current_line, current_file)
28
29 current_line = current_line + 1
30 print_a_line(current_line, current_file)
31
32 current_line = current_line + 1
33 print_a_line(current_line, current_file)
```

Pay close attention to how we pass in the current line number each time

we run `print_a_line`.

What You Should See

```
$ python ex20.py test.txt
First let's print the whole file:
```

```
This is line 1
This is line 2
This is line 3
```

```
Now let's rewind, kind of like a tape.
Let's print three lines:
1 This is line 1
```

```
2 This is line 2
```

```
3 This is line 3
```

Study Drills

1. Go through and write English comments for each line to understand what's going on.
2. Each time `print_a_line` is run, you are passing in a variable `current_line`. Write out what `current_line` is equal to on each function call, and trace how it becomes `line_count` in `print_a_line`.
3. Find each place a function is used, and go check its `def` to make sure that you are giving it the right arguments.
4. Research online what the `seek` function for `file` does. Try `pydoc file` and see if you can figure it out from there.
5. Research the shorthand notation `+=` and rewrite the script to use that.

Common Student Questions

What is `f` in the `print_all` and other functions?

The `f` is a variable just like you had in other functions in Exercise 18, except this time it's a file. A file in Python is kind of like an old tape drive on a mainframe, or maybe a DVD player. It has a "read head," and you

can "seek" this read head around the file to positions, then work with it there. Each time you do `f.seek(0)` you're moving to the start of the file. Each time you do `f.readline()` you're reading a line from the file, and moving the read head to right after the `\n` that ends that file. This will be explained more as you go on.

Why are there empty lines between the lines in the file?

The `readline()` function returns the `\n` that's in the file at the end of that line. This means that `print`'s `\n` is being added to the one already returned by `readline()`. To change this behavior simply add a `,` (comma) at the end of `print` so that it doesn't print its own `\n`.

Why does `seek(0)` not set the `current_line` to 0?

First, the `seek()` function is dealing in *bytes*, not lines. So that's going to the 0 byte (first byte) in the file. Second, `current_line` is just a variable and has no real connection to the file at all. We are manually incrementing it.

What is `+=`?

You know how in English I can rewrite "it is" to be "it's"? Or I can rewrite "you are" to "you're"? That's called a contraction, and this is kind of like a contraction for the two operations `=` and `+`. That means `x = x + y` is the same as `x += y`.

How does `readline()` know where each line is?

Inside `readline()` is code that scans each byte of the file until it finds a `\n` character, then stops reading the file to return what it found so far. The file `f` is responsible for maintaining the current position in the file after each `readline()` call, so that it will keep reading each line.

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