

With Statement Context Managers

When you open a file using `f = open('test.txt')`, the file stays open until you specifically call `f.close()`. Should an exception be raised while working with the file, it remains open. This can lead to vulnerabilities in your code, and inefficient use of resources.

A context manager handles the opening and closing of resources, and provides a built-in `try/finally` block should any exceptions occur.

The best way to demonstrate this is with an example.

Standard `open()` procedure, with a raised exception:

In [1]:

```
p = open('oops.txt', 'a')
p.readlines()
p.close()
```

```
-----
-----
UnsupportedOperation                                Traceback (most rec
ent call last)
<ipython-input-1-ad7a2000735b> in <module>()
      1 p = open('oops.txt', 'a')
----> 2 p.readlines()
      3 p.close()
```

UnsupportedOperation: not readable

Let's see if we can modify our file:

In [2]:

```
p.write('add more text')
```

Out[2]:

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Ouch! I may not have wanted to do that until I traced the exception! Unfortunately, the exception prevented the last line, `p.close()` from running. Let's close the file manually:

In [3]:

```
p.close()
```

Protect the file with `try/except/finally`

A common workaround is to insert a `try/except/finally` clause to close the file whenever an exception is raised:

In [4]:

```
p = open('oops.txt', 'a')
try:
    p.readlines()
except:
    print('An exception was raised!')
finally:
    p.close()
```

An exception was raised!

Let's see if we can modify our file this time:

In [5]:

```
p.write('add more text')
```

```
-----
-----
ValueError                                Traceback (most rec
ent call last)
<ipython-input-5-1209a18e617d> in <module>()
----> 1 p.write('add more text')

ValueError: I/O operation on closed file.
```

Excellent! Our file is safe.

Save steps with with

Now we'll employ our context manager. The syntax follows `with [resource] as [target]: do something`

In [6]:

```
with open('oops.txt', 'a') as p:
    p.readlines()
```

```
-----
-----
UnsupportedOperation                      Traceback (most rec
ent call last)
<ipython-input-6-7ccc44e332f9> in <module>()
      1 with open('oops.txt', 'a') as p:
----> 2     p.readlines()

UnsupportedOperation: not readable
```

Can we modify the file?

In [7]:

```
p.write('add more text')
```

```
-----  
-----  
ValueError                                Traceback (most rec  
ent call last)  
<ipython-input-7-1209a18e617d> in <module>()  
----> 1 p.write('add more text')
```

ValueError: I/O operation on closed file.

Great! With just one line of code we've handled opening the file, enclosing our code in a `try/finally` block, and closing our file all at the same time.

Now you should have a basic understanding of context managers.