



# Learning Python

## Session 7 - Reading Files



# File Processing

- A text file can be thought of as a sequence of lines

From stephen.marquard@uct.ac.za Sat Jan 5 09:14:16 2008

Return-Path: <postmaster@collab.sakaiproject.org>

Date: Sat, 5 Jan 2008 09:12:18 -0500

To: source@collab.sakaiproject.org

From: stephen.marquard@uct.ac.za

Subject: [sakai] svn commit: r39772 - content/branches/

Details: <http://source.sakaiproject.org/viewsvn/?view=rev&rev=39772>

# Opening a File

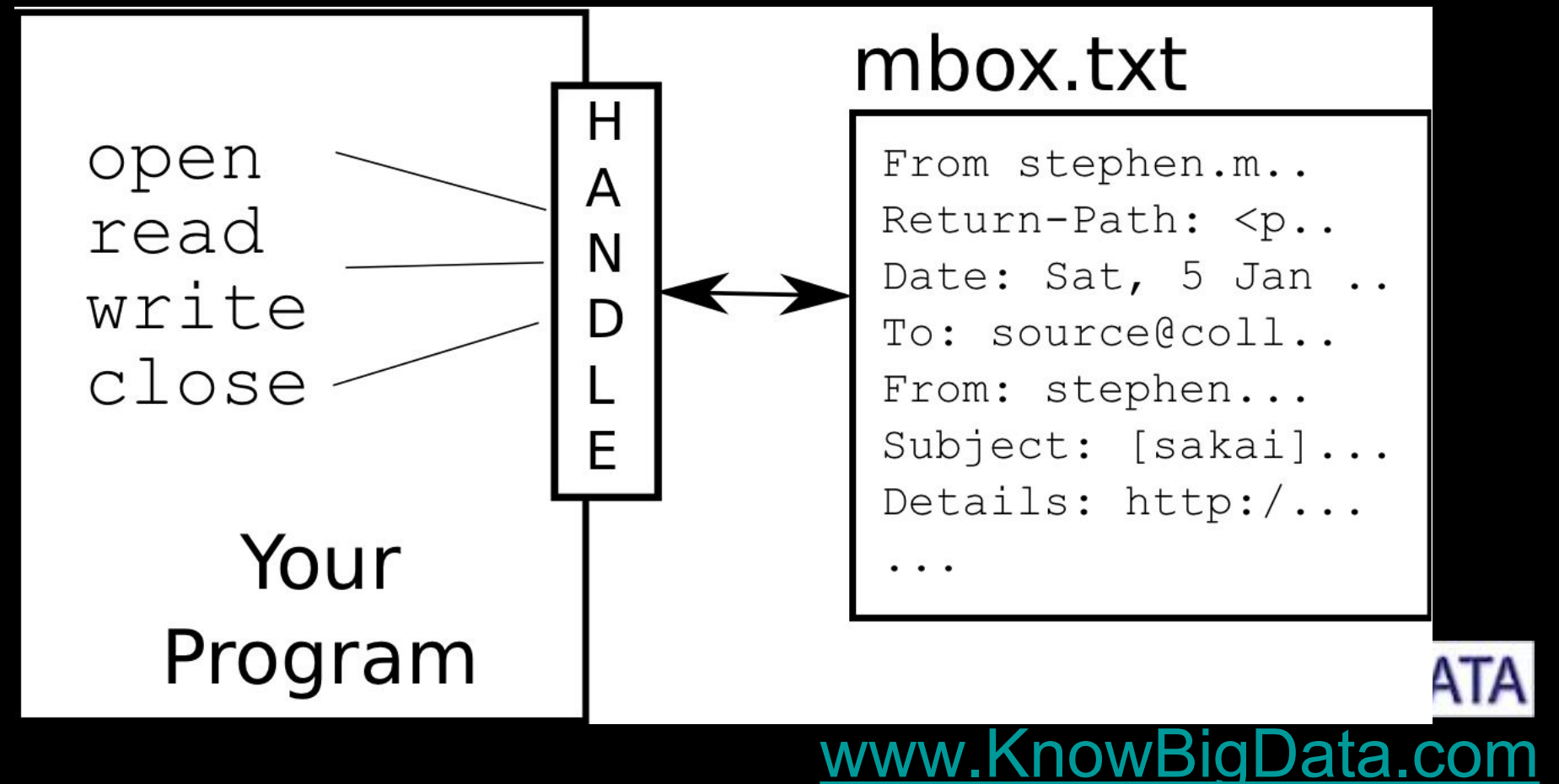
- Before we can read the contents of the file, we must tell Python which file we are going to work with and what we will be doing with the file
- This is done with the `open()` function
- `open()` returns a “file handle” - a variable used to perform operations on the file
- Similar to “File -> Open” in a Word Processor

# Using open()

- `handle = open(filename, mode)`      `fhand = open('mbox.txt', 'r')`
  - returns a handle use to manipulate the file
  - filename is a string
  - mode is optional and should be 'r' if we are planning to read the file and 'w' if we are going to write to the file

# What is a Handle?

```
>>> fhand = open('mbox.txt')
>>> print fhand
<open file 'mbox.txt', mode 'r' at 0x1005088b0>
```



# When Files are Missing

```
>>> fhand = open('stuff.txt')
Traceback (most recent call last):  File
"<stdin>", line 1, in <module>IOError: [Errno 2]
No such file or directory: 'stuff.txt'
```

# The **newline** Character

- We use a special character called the “**newline**” to indicate when a line ends
- We represent it as **\n** in strings
- **Newline** is still one character
  - not two

```
>>> stuff = 'Hello\nWorld!'
>>> stuff
'Hello\nWorld!'
>>> print stuff
Hello
World!
>>> stuff = 'X\nY'
>>> print stuff
X
Y
>>> len(stuff)
3
```



# File Processing

- A text file can be thought of as a sequence of lines

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# File Processing

- A text file has **newlines** at the end of each line

```
From stephen.marquard@uct.ac.za Sat Jan 5 09:14:16 2008\nReturn-Path: <postmaster@collab.sakaiproject.org>\nDate: Sat, 5 Jan 2008 09:12:18 -0500\nTo: source@collab.sakaiproject.org\nFrom: stephen.marquard@uct.ac.za\nSubject: [sakai] svn commit: r39772 - content/branches/\n\nDetails: http://source.sakaiproject.org/viewsvn/?view=rev&rev=39772\n
```

# File Handle as a Sequence

- A **file handle** open for read can be treated as a **sequence** of strings where each line in the file is a string in the sequence
- We can use the **for** statement to iterate through a **sequence**
- Remember - a **sequence** is an ordered set

```
xfile = open('mbox.txt')  
for cheese in xfile:  
    print cheese
```

# Counting Lines in a File

- Open a **file** read-only
- Use a **for** loop to read each line
- **Count** the lines and print out the number of lines

```
fhand = open('mbox.txt')  
count = 0  
for line in fhand:  
    count = count + 1  
print 'Line Count:', count
```

```
$ python open.py  
Line Count: 132045
```

# Reading the \*Whole\* File

- We can **read** the whole file (newlines and all) into a **single string**

```
>>> fhand = open('mbox-short.txt')
>>> inp = fhand.read()
>>> print len(inp)
94626
>>> print inp[:20]
From stephen.marquar
```

# Searching Through a File

- We can put an **if** statement in our **for** loop to only print lines that meet some criteria

```
fhand = open('mbox-short.txt')
for line in fhand:
    if line.startswith('From:') :
        print line
```

# OOPS!

What are all these blank  
lines doing here?

From: `stephen.marquard@uct.ac.za`

From: `louis@media.berkeley.edu`

From: `zqian@umich.edu`

From: `rjlowe@iupui.edu`

...

# OOPS!

What are all these blank lines doing here?

- Each **line** from the file has a **newline** at the end
- The **print** statement adds a **newline** to each line

```
From: stephen.marquard@uct.ac.za\n\nFrom: louis@media.berkeley.edu\n\nFrom: zqian@umich.edu\n\nFrom: rjlowe@iupui.edu\n\n...
```



# Searching Through a File (fixed)

- We can strip the whitespace from the right-hand side of the string using `rstrip()` from the string library
- The newline is considered “white space” and is **stripped**

```
fhand = open('mbox-short.txt')
for line in fhand:
    line = line.rstrip()
    if line.startswith('From:') :
        print line
```

```
From: stephen.marquard@uct.ac.za
From: louis@media.berkeley.edu
From: zqian@umich.edu
From: rjlowe@iupui.edu
```

....

# Skipping with continue


- We can conveniently skip a line by using the **continue** statement

```
fhand = open('mbox-short.txt')
for line in fhand:
    line = line.rstrip()
    if not line.startswith('From: ') :
        continue ←
    print line
```

# Using **in** to select **lines**

- We can look for a string anywhere **in** a **line** as our selection criteria

```
fhand = open('mbox-short.txt')
for line in fhand:
    line = line.rstrip()
    if not '@uct.ac.za' in line :
        continue
    print line
```



From stephen.marquard@uct.ac.za Sat Jan 5 09:14:16 2008

X-Authentication-Warning: set sender to stephen.marquard@uct.ac.za using -f

From: stephen.marquard@uct.ac.za

Author: stephen.marquard@uct.ac.za

From david.horwitz@uct.ac.za Fri Jan 4 07:02:32 2008

X-Authentication-Warning: set sender to david.horwitz@uct.ac.za using -f...

# Prompt for File Name

```
fname = raw_input('Enter the file name: ')
fhand = open(fname)
count = 0
for line in fhand:
    if line.startswith('Subject:'):
        count = count + 1
print 'There were', count, 'subject lines in', fname
```

Enter the file name: mbox.txt  
There were 1797 subject lines in mbox.txt

Enter the file name: mbox-short.txt  
There were 27 subject lines in mbox-short.txt

# Bad File Names

```
fname = raw_input('Enter the file name: ')
try:
    fhand = open(fname)
except:
    print 'File cannot be opened:', fname
    exit()

count = 0
for line in fhand:
    if line.startswith('Subject:') :
        count = count + 1
print 'There were', count, 'subject lines in', fname
```

Enter the file name: mbox.txt

There were 1797 subject lines in mbox.txt

Enter the file name: na na boo boo

File cannot be opened: na na boo boo

# Summary

- Secondary storage
- Opening a file - file handle
- File structure - newline character
- Reading a file line by line with a for loop
- Searching for lines
- Reading file names
- Dealing with bad files

# Questions?

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