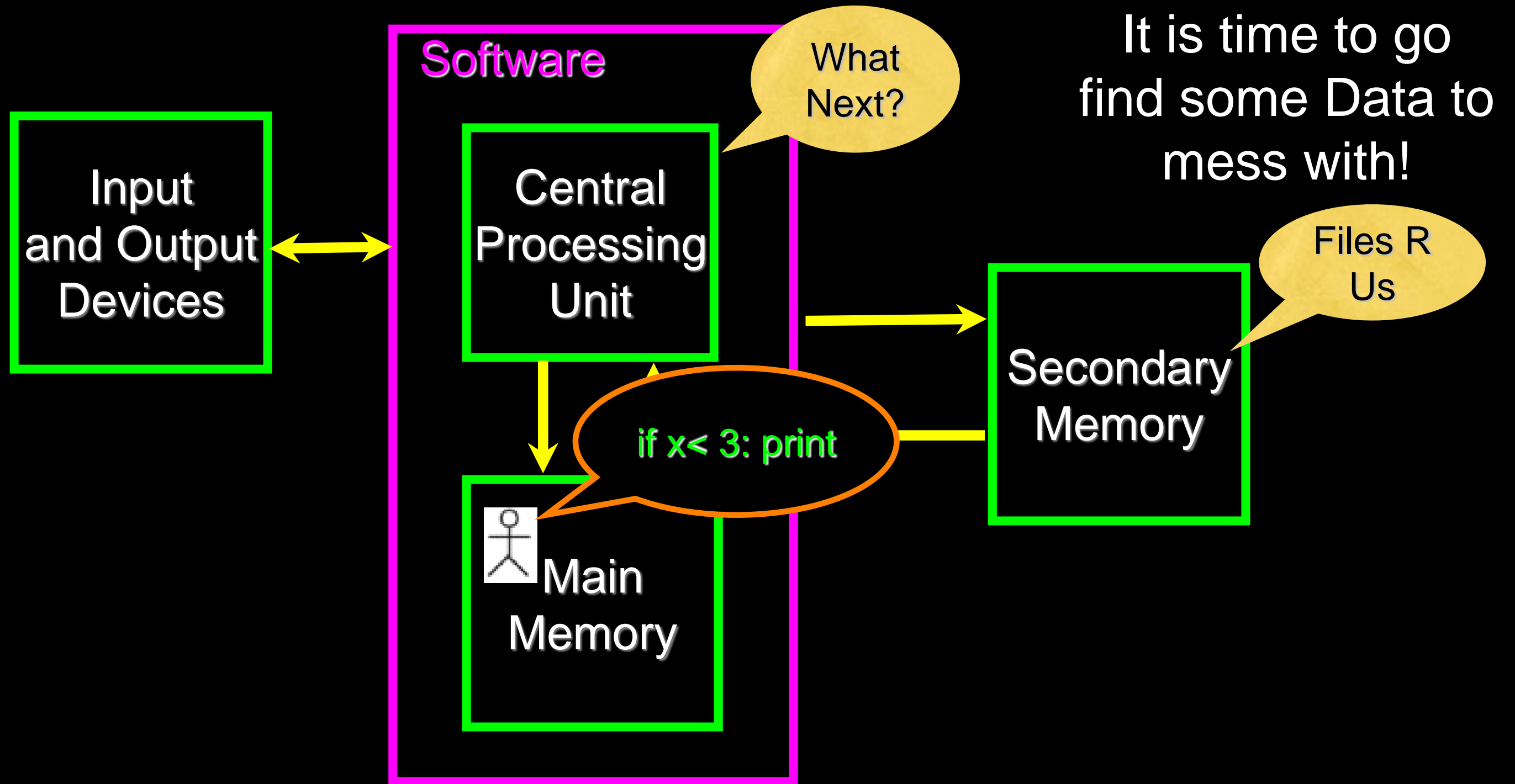


Reading Files

Chapter 7



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 -0500To:

source@collab.sakaiproject.orgFrom:

stephen.marquard@uct.ac.zaSubject: [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
- Kind of like “File -> Open” in a Word Processor

Using open()

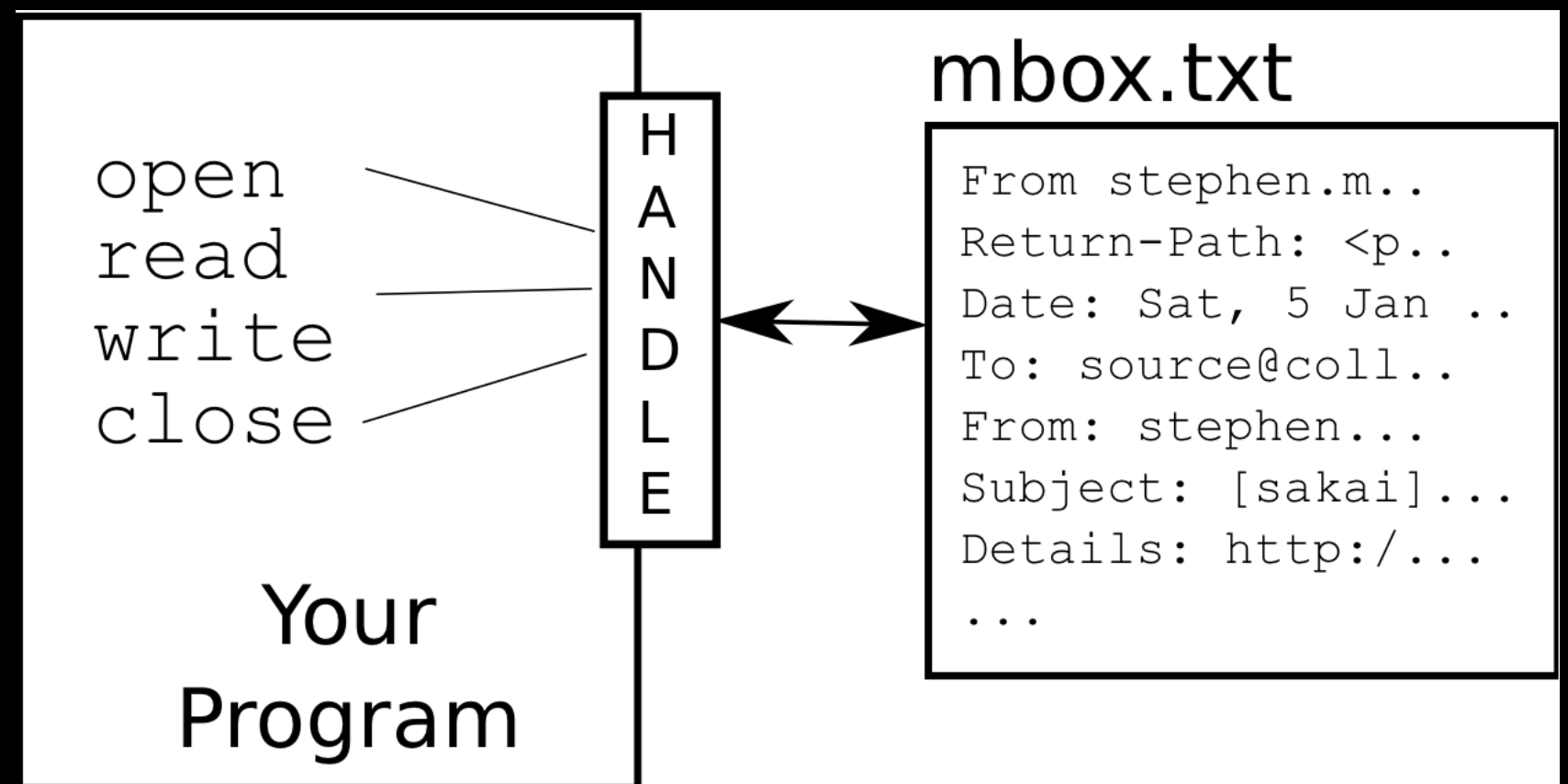
- `handle = open(filename, mode)` `fhand = open('mbox.txt', 'r')`
- returns a handle use to manipulate the file
- `filename` is a string
- `mode` is optional and should be 'r' if we are planning reading the file and 'w' if we are going to write to the file.

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 to indicate when a line ends called the "`newline`"
- We represent it as `\n` in strings
- `Newline` is still one character - not two

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


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 -0500To:

source@collab.sakaiproject.orgFrom:

stephen.marquard@uct.ac.zaSubject: [sakai] svn commit: r39772 -

content/branches/Details:

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

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\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
```

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

From: louis@media.berkeley.edu\n

From: zqian@umich.edu\n

From: rjlowe@iupui.edu\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

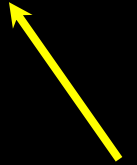
```
fhand = open('mbox-short.txt')
for line in fhand:
    line = line.rstrip()
    if not line.startswith('From:') :
        continue
    print line
```



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...
```

```
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
```

Prompt for File Name



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

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