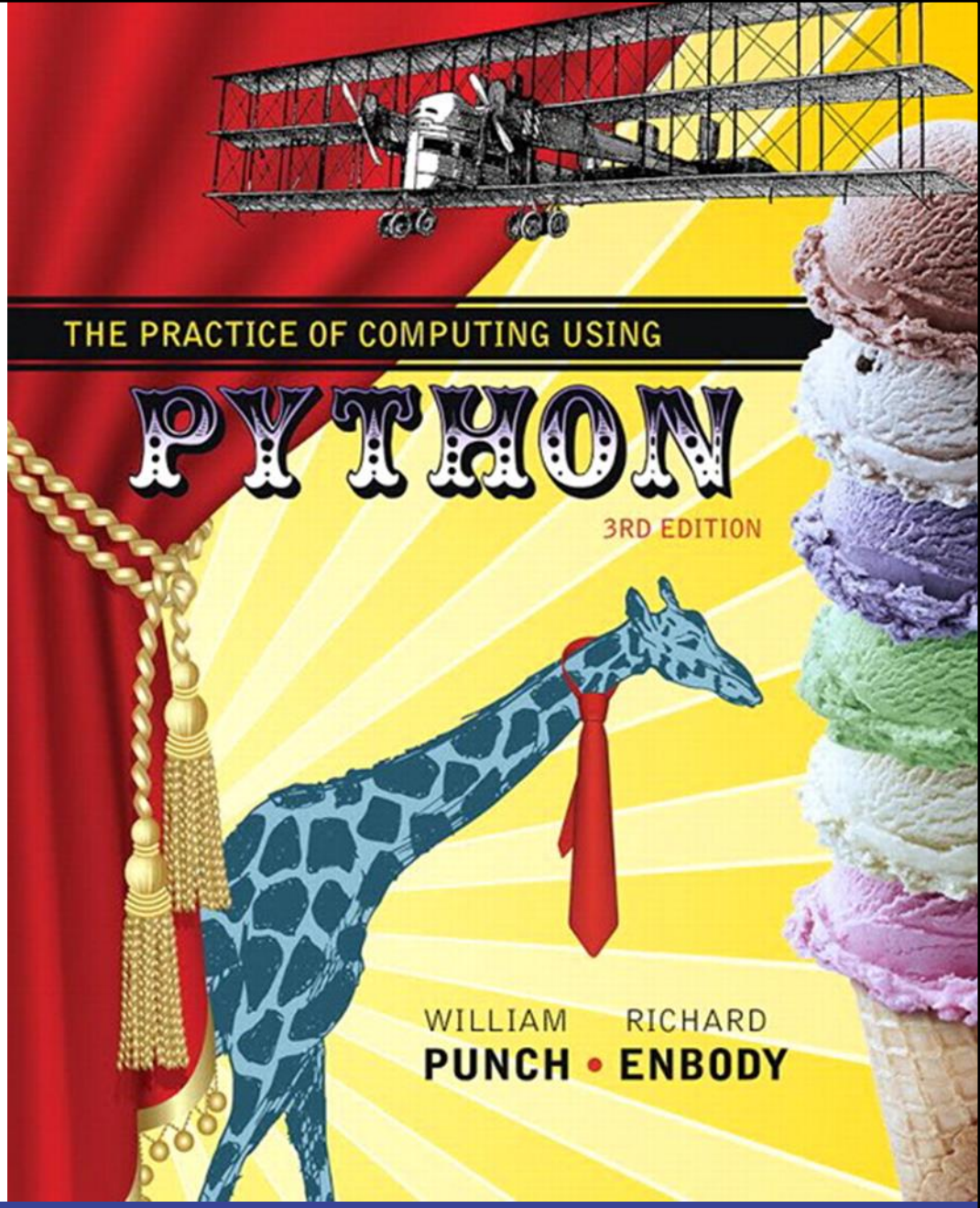
chapter 14

Files and Exceptions II



What We Already Know

- files are bytes on disk
- two types of files: text and binary (we are working with text)
- **`open`** creates a connection between the disk contents and the program
- different modes of opening a file: 'r', 'w', 'a'
- files might have different encodings (default is utf_8)

More of What We Know

- all access, reading or writing, to a text file is by the use of strings
- iteration via a **`for`** loop gathers info from a file opened for reading one line at a time
- we write to a file opened for reading using the **`print`** function with an argument **`file=`**

```
# Prompt for three values: input file, output file, search string.
# Search for the string in the input file, write results to the
# output file

import sys
def process_file(i_file, o_file, a_str):
    ''' if the a_str is in a line of i_file, add stars
        to the a_str in line, write it out with the
        line number to o_file '''
    line_count_int = 1
    for line_str in i_file:
        if a_str in line_str:
            new_line_str = line_str.replace(a_str, '***'+a_str)
            print('Line {}: {}'.format(line_count_int, new_line_str),\
                  file=o_file)
        line_count_int += 1

try:
    in_file_str = input("File to search:")
    in_file = open(in_file_str, 'r', encoding='utf_8')
except IOError:
    print('{} is a bad file name'.format(in_file_str))
    sys.exit()

out_file_str = input("File to write results to:")
out_file = open(out_file_str, 'w')
search_str = input("Search for what string:")
process_file(in_file, out_file, search_str)
in_file.close()
out_file.close()
```

Results: Searching for `"This"`

inFile.txt	outFile.txt
This is a test	Line 1: ***This is a test
This is only a test	
Do not pass go	Line 2: ***This is only a test
Do not collect $200	

More Ways to Read a File

- **`my_file.read()`**
  - reads the entire contents of the file as a string and returns it
  - optional argument integer to limit read to N bytes

    `my_file.read(N)`
- **`my_file.readline()`**
  - returns the next line as a string
- **`my_file.readlines() # note plural`**
  - returns a ***single list*** of all the lines from the file

Example File

- we'll work with a file called **`temp.txt`** which has the following file contents

```
First Line
Second Line
Third Line
Fourth Line
```

```
>>> temp_file = open("temp.txt","r")       # open file for reading
>>> first_line_str = temp_file.readline() # read exactly one line
>>> first_line_str
'First line\n'
>>> for line_str in temp_file:    # read remaining lines
        print(line_str)

Second line

Third line

Fourth line

>>> temp_file.readline()          # file read, return empty str
''
>>> temp_file.close()
```

```
>>> temp_file = open("temp.txt","r")  # open file for reading
>>> temp_file.read(1)                 # read 1 char
'F'
>>> temp_file.read(2)                 # read the next 2 chars
'ir'
>>> temp_file.read()                  # read remaining file
'st line\nSecond line\nThird line\nFourth line\n'
>>> temp_file.read(1)                 # file read, return empty string
''
>>> temp_file.close()
```

```
>>> temp_file = open("temp.txt","r")                # open file for reading
>>> file_contents_list = temp_file.readlines() # read all file lines into a list
>>> file_contents_list
['First line\n', 'Second line\n', 'Third line\n', 'Fourth line\n']
>>>
```

More Ways to Write a File

- once opened, you can write to a file (if the mode is appropriate)

  `my_file.write(s)`

  which writes the string **`s`** to the file

  `my_file.writelines(lst)`

  which writes a ***list of strings*** (one at a time) to the file

```
>>> word_list = ['First', 'Second', 'Third', 'Fourth']
>>> out_file = open('outFile.txt', 'w')
>>> for word in word_list:
...     out_file.write(word + ' line\n')
...
>>> out_file.close()
>>>
```

Universal New Line

Different OS's, Different Format

- each operating system (Windows, OS X, Linux) developed certain standards for representing text
- in particular, they chose different ways to represent the end of a file, the end of a line, etc.

Operating System	Character Combination
Unix & Mac OS X	`'\n'`
MS Windows	`'\r\n'`
Mac (pre-OS X)	`'\r'`

TABLE 14.1 End-of-Line Characters

Universal New Line

- to get around this, Python provides ***by default*** a special file option to deal with variations of OS text encoding called universal new line
- you can override this with an option to **`open`** called **`newline=`**
  - look at the docs for what this entails

Working with a File

Current File Position

- every file maintains a ***current file position***
  - it is the current position in the file, and indicates what the file will read next
  - set by the mode table above

File Object Buffer

- when the disk file is opened, the contents of the file are copied into the buffer of the file object
- think of the file object as a very big list, where every index is one of the pieces of information of the file
- the current position is the present index in that list

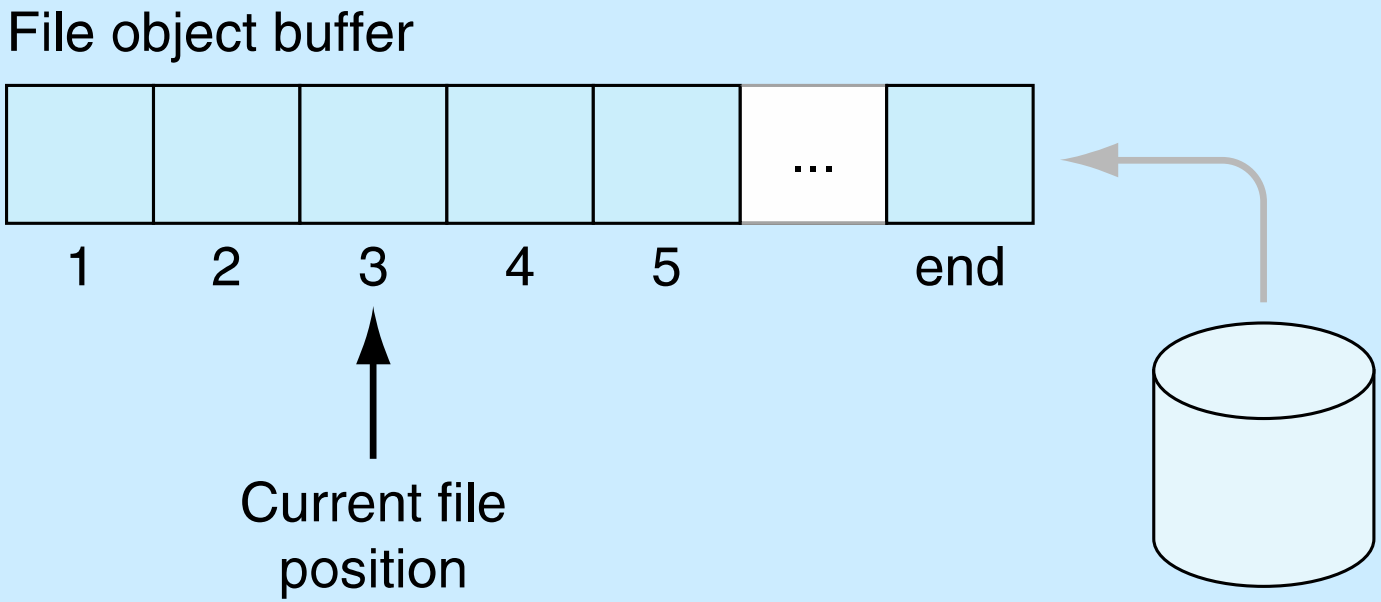


FIGURE 14.1 Current file position.

The `tell()` Method

- the `tell()` method tells the current file position
- the positions are in bytes (think characters for UTF-8) from the beginning of the file
- example

```
my_file.tell() => 42
```

The `seek()` Method

- the **`seek()`** method updates the current file position to a new file index (in bytes offset from the beginning of the file)

```
fd.seek(0)   # to beginning of file
fd.seek(100) # 100 bytes from beg
```

Counting Bytes is a Pain

- counting bytes is a pain
- **`seek`** has an optional argument set
  - `0`: count from the beginning (default)
  - `1`: count for the current file position
  - `2`: count from the end (backwards)

Every Read Moves Current Position Forward

- every **`read`**/**`readline`**/**`readlines`** moves the current position forward
- when you hit the end, every read will just yield `''` (empty string), since you are at the end
  - no indication of end-of-file this way!
- you need to seek to the beginning to start again (or close and open; **`seek`** is easier)

```
>>> test_file = open('temp.txt','r')
>>> test_file.tell()            # where is the current file position?
0
>>> test_file.readline()        # read first line
'First Line\n'
>>> test_file.tell()            # where are we now?
11
>>> test_file.seek(0)           # go to beginning
0
>>> test_file.readline()        # read first line again
'First Line\n'
>>> test_file.readline()        # read second line
'Second Line\n'
>>> test_file.tell()            # where are we now?
23
>>> test_file.seek(0,2)         # go to end
46
>>> test_file.tell()            # where are we now?
46
>>> test_file.readline()        # try readline at end of file: nothing there
''
>>> test_file.seek(11)          # go to the end of the first line (see tell above)
11
>>> test_file.readline()        # when we read now we get the second line
'Second Line\n'
>>> test_file.close()
>>> test_file.readline()        # Error: reading after file is closed
Traceback (most recent call last):
  File "<pyshell#65>", line 1, in <module>
    test_file.readline()
ValueError: I/O operation on closed file.
>>>
```

`with` Statement

`open` and `close` occur in pairs (or should), so Python provides a shortcut, the `with` statement

- creates a context that includes an exit which is invoked automatically
- for files, the exit is to close the file

```
with expression as variable:
    suite
```

`with` Statement

- file is closed automatically when the suite ends

```
>>> with open('temp.txt') as temp_file:
...     temp_file.readlines()
...
['First line\n', 'Second line\n', 'Third line\n', 'Fourth line\n']
>>>
```

`read(size=1)`

- you can use the **`read()`** method to read just one byte at a time
- in combination with **`seek`**, move around the file and “look for things”
- once current is set, you can begin reading again

More on CSV Files

Spreadsheets

- the spreadsheet is a very popular, and powerful, application for manipulating data
- its popularity means there are many companies that provide their own version of the spreadsheet
- it would be nice if those different versions could share their data

CSV and Basic Sharing

- a basic approach to share data is the comma separated value (CSV) format
  - it is a text format, accessible to all apps
  - each line (even if blank) is a row
  - in each row, each value is separated from the others by a comma (even if it is blank)
  - cannot capture complex things like a formula

Spread Sheet and Corresponding CSV File

Name	Exam1	Exam2	Final Exam	Overall Grade
Bill	75.00	100.00	50.00	**75.00**
Fred	50.00	50.00	50.00	**50.00**
Irving	0.00	0.00	0.00	**0.00**
Monty	100.00	100.00	100.00	**100.00**
Average				**56.25**

FIGURE 14.2 A simple spreadsheet from Microsoft Excel 2008.

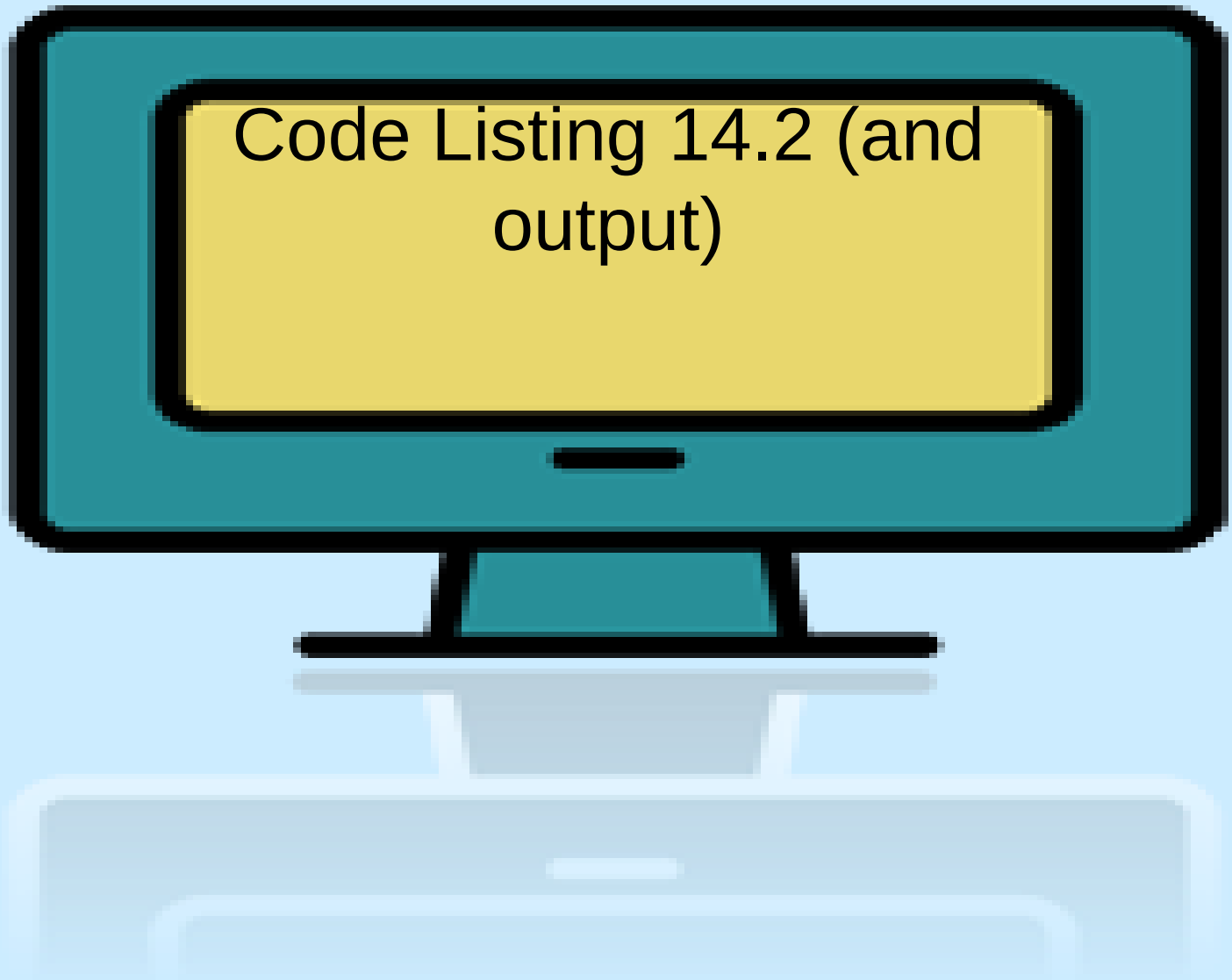
```
Name,Exam1,Exam2,Final Exam,Overall Grade
Bill,75.00,100.00,50.00,75.00
Fred,50.00,50.00,50.00,50.00
Irving,0.00,0.00,0.00,0.00
Monty,100.00,100.00,100.00,100.00

Average,,,,56.25
```

Even CSV Isn't Universal

- as simple as that sounds, even CSV format is not completely universal
  - different apps have small variations
- Python provides a module to deal with these variations called the CSV module
- this module allows you to read spreadsheet info into your program

CSV Reader

- import the CSV module
- open the file normally, creating a file object
- create an instance of a CSV reader, used to iterate through the file just opened
  - you provide the file object as an argument to the constructor
- iterating with the reader object yields a row as a list of strings


Code Listing 14.2 (and output)

```
import csv
workbook_file = open('Workbook1.csv','r')
workbook_reader = csv.reader(workbook_file)

for row in workbook_reader:
    print(row)

workbook_file.close()
```

```
>>>
['Name', 'Exam1', 'Exam2', 'Final Exam', 'Overall Grade']
['Bill', '75.00', '100.00', '50.00', '75.00']
['Fred', '50.00', '50.00', '50.00', '50.00']
['Irving', '0.00', '0.00', '0.00', '0.00']
['Monty', '100.00', '100.00', '100.00', '100.00']
[]
['Average', '', '', '', '56.25']
>>>
```

Considerations

- universal new line is working by default
  - needed for this worksheet
- a blank line in the CSV shows up as an empty list
- an empty column shows up as an empty string in the list

CSV Writer

much the same, except

- the opened file must be write-enabled
- the method is **`writerow`**, and it takes a ***list of strings*** to be written as a row

Code Listing 14.3

- this code listing is a good example of reading, modifying and then writing out a CSV file that could be read by a spreadsheet
- it involves lots of slicing (and has comments) so it is a good exercise

The `os` Module

What is the `os` Module?

- the `os` module in Python is an interface between the operating system and the Python language
- as such, it has many sub-functionalities dealing with various aspects
- we will look mostly at the file-related stuff

What is a Directory/Folder?

- whether in Windows, Linux or on OS X, all OS's maintain a ***directory structure***
- a directory is a container of files or other directories
- these directories are arranged in a hierarchy or tree
  - remember hierarchy from Chapter 12

Computer Science ***Tree***

- it has a ***root*** node, with ***branch*** nodes, ends in ***leaf*** nodes
- the directory structure is a hierarchy (tree)

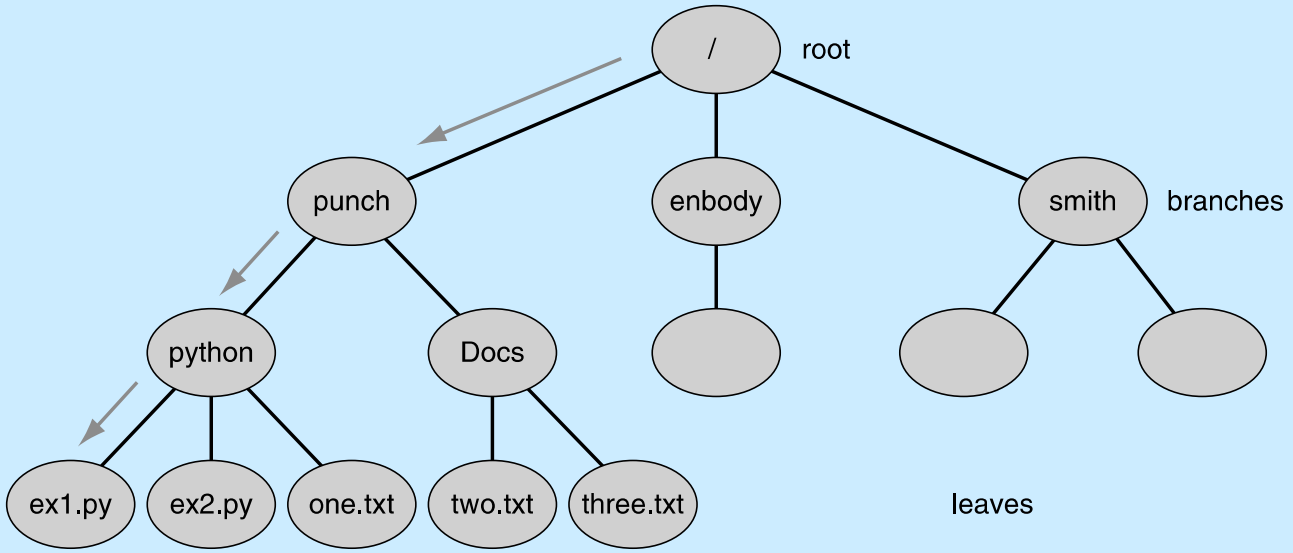


FIGURE 14.4 Directory tree with path /punch/python/ex1.py, marked with arrows.

Directory Tree

- directories can be organized in a hierarchy, with the root directory and subsequent branch and leaf directories
- each directory can hold files or other directories
- allows for sub and super directories
  - just like in subclass/superclass in Chapter 12

File Path

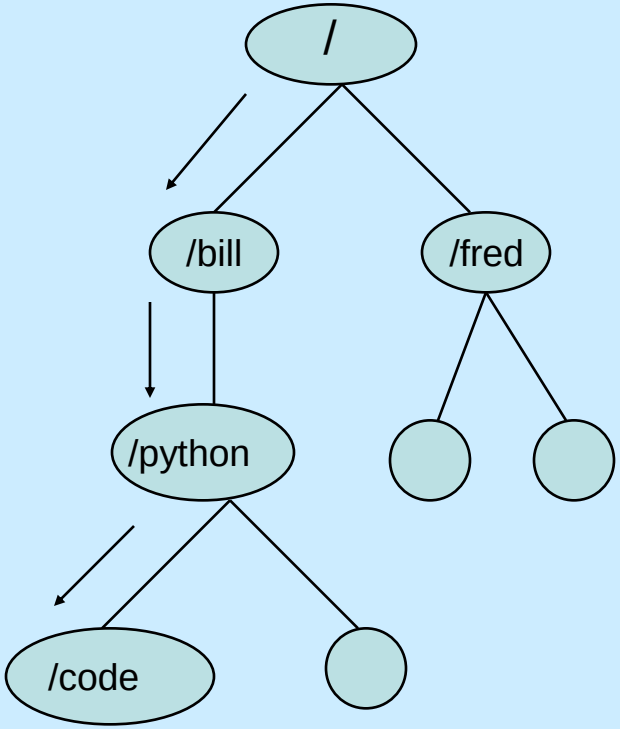
- a path to a file is a path through the hierarchy to the node that contains a file

`/bill/python/code/myCode.py`

  - path from the root node **`/`**, to the **`bill`** directory, to the **`python`** directory, to the **`code`** directory where the file, **`myCode.py`**, resides

The / in a Path

- think of / as an operator, showing something is a directory
- follow the path
- the leaf is either a directory or file



A Path String

- a valid path string for Python is a string which indicates a valid path in the directory structure

  `'/Users/bill/python/code.py'`

  is a valid path string

Different ‘Paths’ for Different Operating Systems

- each OS has its own way of specifying a path
  - Windows: **`C:\bill\python\myFile.py`**
  - linux: **`/Users/bill/python/myFile.py`**
- nicely, Python knows that and translates to the appropriate OS

Two Special Directory Names

- the directory name `.` is shortcut for the name of the current directory you are in as you traverse the directory tree
- the directory name `..` is a shortcut for the name of the parent directory of the current directory you are in

Some `os` Commands

- **`os.getcwd()`**
  - returns the full path of the current working directory
- **`os.chdir(path_str)`**
  - changes the current directory to the path provided
- **`os.listdir(path_str)`**
  - returns a list of the files and directories in the path (including `.`)

```
>>> import os                      # load the os package
>>> os.chdir("/punch/python") # change to the example starting point
>>> os.getcwd()                   # check that we are there
'/punch/python'
>>> os.listdir(".") # list contents of current directory, indicated by "."
['ex1.py', 'ex2.py', 'one.txt']
>>> dir_list = os.listdir(".")      # we can give that list a name
>>> dir_list
['ex1.py', 'ex2.py', 'one.txt']
>>> os.listdir("/punch")       # list the contents at some path
['Docs', 'python']
```

More `os` Commands

- **`os.rename(source_path_str, dest_path_str)`**
  - renames a file or directory
- **`os.mkdir(path_str)`**
  - makes a new directory, e.g.,

    `os.mkdir('/Users/bill/python/new')` creates the directory **`new`** under the directory **`python`**
- **`os.remove(path_str)`**
  - removes the file
- **`os.rmdir(path_str)`**
  - removes the directory (directory must be empty)

The **`walk`** Function

- **`os.walk(path_str)`**
  - starts at the directory in **`path_str`**
  - yields three values:
    - **`dir_name`**, name of the current directory
    - **`dir_list`**, list of subdirectories in the directory
    - **`files`**, list of files in the directory
  - if you iterate through, **`walk`** will visit every directory in the tree
    - default is top down

walk Example

```
>>> os.getcwd()                                  # check our starting point
'/punch'
>>> for dir_name, dirs, files in os.walk("."):  # "walk" in the current directory
        print(dir_name, dirs, files)

. ['Docs', 'python'] []  # current directory, list of 2 subdirectories, no files
./Docs [] ['three.txt', 'two.txt']    # Does directory, no subdirectories, 3 files
./python [] ['ex1.py', 'ex2.py', 'one.txt'] # directory, no subdirectories, 3 files
>>>
```

`os.path` Module

`os.path` Module

- allows you to gather some info on a path's existence
- **`os.path.isfile(path_str)`**
  - is this a path to an existing file? (T/F)
- **`os.path.isdir(path_str)`**
  - is this a path to an existing directory (T/F)
- **`os.path.exists(path_str)`**
  - does the path (either as a file or directory) exist? (T/F)

`os.path` Names

assume `p = '/Users/bill/python/myFile.py'`

- `os.path.basename(p)`
  - returns `'myFile.py'`
- `os.path.dirname(p)`
  - returns `'/Users/bill/python'`
- `os.path.split(p)`
  - returns `('/Users/bill/python','myFile.py')`
- `os.path.splitext(p)`
  - returns `('/Users/bill/python/myFile','.py')`
- `os.path.join(os.path.split(p)[0],'other.py')`
  - returns `'/Users/bill/python/other.py'`


Code Listing 14.4

Utility to Find Strings in Files

- the main point of this function is to look through all the files in a directory structure and see if a particular string exists in any of those files
- useful for mining a set of files
- lots of comments so you can follow

```
def check(search_str,count,files_found_list,dirs_found_list):
    for dirname,dir_list,file_list in os.walk("."):   # walk the subtree
        for f in file_list:
            if os.path.splitext(f)[1] == ".txt":  # if it is a text file
                count = count + 1                 # add to count of files examined
                a_file = open(os.path.join(dirname,f),'r')  # open text file
                file_str = a_file.read()          # read whole file into string


                if search_str in file_str:        # is search_str in file?
                    filename = os.path.join(dirname,f)  # if so, create path
                                                          for file
                    files_found_list.append(filename)   # and add to file list
                    if dirname not in dirs_found_list:  # if directory is not
                        dirs_found_list.append(dirname)   # and directory list
                a_file.close()
    return count
```

More Exceptions

What We Already Know

`try/except` suite to catch errors

```
try:
    suite to watch
except ParticularError:
    error suite
```

More of What We Know

- **`try`** suite contains code that we want to watch
  - if an error occurs, the **`try`** suite stops and looks for an **`except`** suite that can handle the error
- **`except`** suite has a particular error it can handle and a suite of code for handling that error

Error Flow

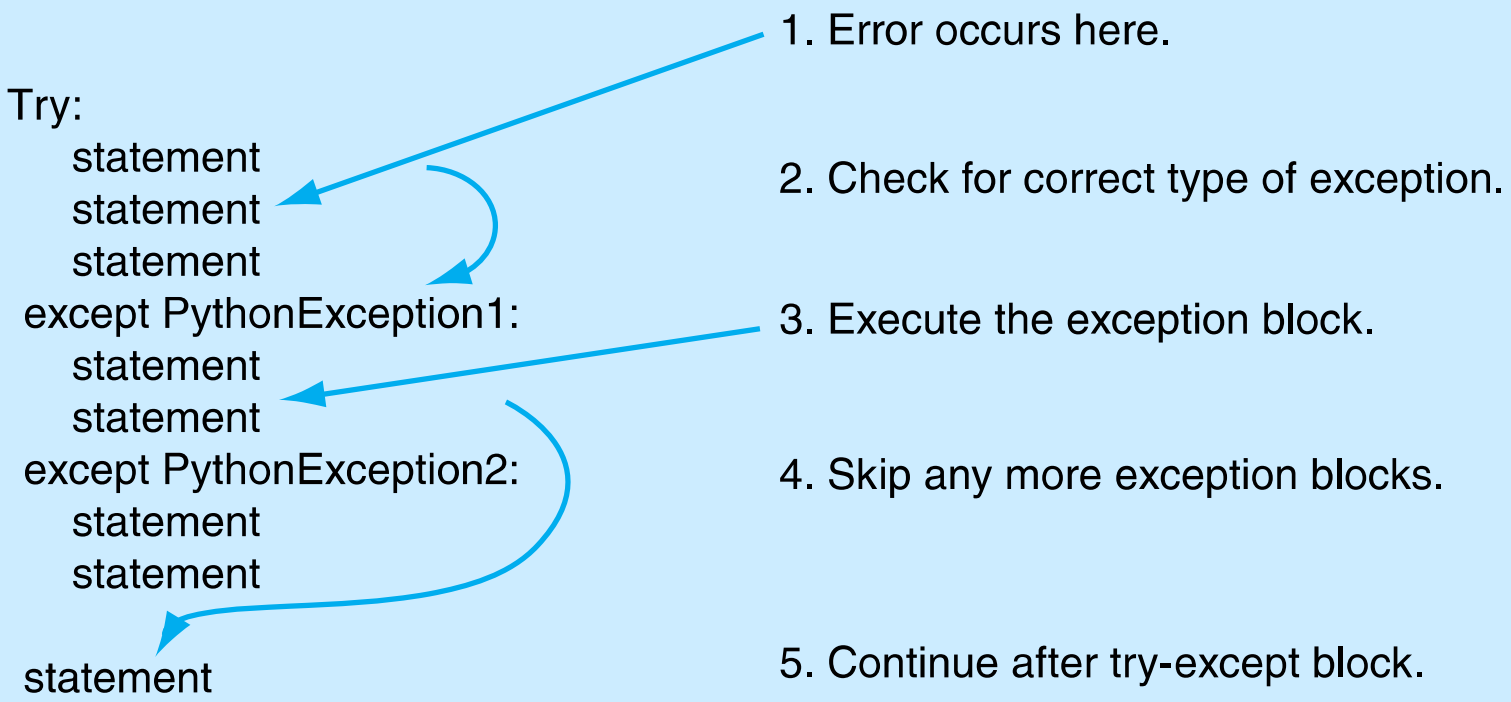


FIGURE 14.5 Exception flow.

```
try:
    print("Entering the try suite")
    dividend = float(input("Provide a dividend to divide:"))
    divisor = float(input("Provide a divisor to divide by:"))
    result = dividend/divisor
    print("{:2.2f} divided by {:2.2f} yields {:2.2f}".\
        format(dividend,divisor,result))
except ZeroDivisionError:
    print("Divide by 0 error")
except ValueError:
    print("Value error, could not convert to a float")

print("Continuing on with the rest of the program")
```

```
>>>
Entering the try suite
Provide a dividend to divide:10
Provide a divisor to divide by:2
10.00 divided by 2.00 yields 5.00
Continuing on with the rest of the program
>>> ================================ RESTART ================================
>>>
Entering the try suite
Provide a dividend to divide:10
Provide a divisor to divide by:a
Value error, could not convert to a float
Continuing on with the rest of the program
```

```
>>> ================================ RESTART ================================
>>>
Entering the try suite
Provide a dividend to divide:10
Provide a divisor to divide by:0
Divide by 0 error
Continuing on with the rest of the program
>>> ================================ RESTART ================================
>>>
Entering the try suite
Provide a dividend to divide:

Traceback (most recent call last):
  File "/Users/bill/book/v3.5/chapterExceptions/divide.py", line 3, in <module>
    dividend = float(input("Provide a dividend to divide:"))
KeyboardInterrupt
>>>
```

Check for Specific Exceptions

- you don’t have to check for an exception type
  - you can just have an exception without a particular error and it will catch anything
  - not a good idea: how can you fix (or recover from) an error if you don’t know the kind of exception?
- label your exceptions, all that you expect!

Exception Names

- in Python, there is a set of exceptions that are pre-labeled
- to find the exception for a case you are interested it, try to produce the error in the interpreter and see what name comes up
  - the interpreter tells you what the exception is for that case

```
BaseException
 +-- SystemExit
 +-- KeyboardInterrupt
 +-- GeneratorExit
 +-- Exception
      +-- StopIteration
      +-- StopAsyncIteration
      +-- ArithmeticError
      |    +-- FloatingPointError
      |    +-- OverflowError
      |    +-- ZeroDivisionError
      +-- AssertionError
      +-- AttributeError
      +-- BufferError
      +-- EOFError
      +-- ImportError
      +-- LookupError
      |    +-- IndexError
      |    +-- KeyError
      +-- MemoryError
      +-- NameError
      |    +-- UnboundLocalError
      +-- OSError
      |    +-- BlockingIOError
      |    +-- ChildProcessError
      |    +-- ConnectionError
      |    |    +-- BrokenPipeError
      |    |    +-- ConnectionAbortedError
      |    |    +-- ConnectionRefusedError
      |    |    +-- ConnectionResetError
      |    +-- FileExistsError
      |    +-- FileNotFoundError
      |    +-- InterruptedError
      |    +-- IsADirectoryError
      |    +-- NotADirectoryError
      |    +-- PermissionError
      |    +-- ProcessLookupError
      |    +-- TimeoutError
```

from Python docs webpage

```
      +-- ReferenceError
      +-- RuntimeError
      |    +-- NotImplementedError
      |    +-- RecursionError
      +-- SyntaxError
      |    +-- IndentationError
      |         +-- TabError
      +-- SystemError
      +-- TypeError
      +-- ValueError
      |    +-- UnicodeError
      |         +-- UnicodeDecodeError
      |         +-- UnicodeEncodeError
      |         +-- UnicodeTranslateError
      +-- Warning
           +-- DeprecationWarning
           +-- PendingDeprecationWarning
           +-- RuntimeWarning
           +-- SyntaxWarning
           +-- UserWarning
           +-- FutureWarning
           +-- ImportWarning
           +-- UnicodeWarning
           +-- BytesWarning
           +-- ResourceWarning
```

Examples

```
In  [1]: 1/0Out [1]:
Traceback (most recent call last):  File
  "<pyshell#9>", line 1, in <module>    1/0
ZeroDivisionError: integer division or
  modulo by zero


In  [2]: open("junk")
Out [2]: Traceback (most recent call last):
  File "<stdin>", line 1, in <module>
FileNotFoundError: [Errno 2] No such file
  or directory: 'junk'
```

error names; CAPS matter!

Philosophy of Exception Handling

Dealing with Problems

two ways to deal with exceptions

- ***LBYL***: Look Before you Leap
- ***EAFP***: Easier to Ask Forgiveness than Permission (famous quote by Grace Hopper)

Look Before You Leap

- before we execute a statement, we check all aspects to make sure it executes correctly
  - if it requires a string, check that
  - if it requires a dictionary key, check that
- tends to make code messy
  - the heart of the code (what you want it to do) may be hidden by all the checking

Easier to Ask Forgiveness than Permission

- run any statement you want, no checking required
  - however, be ready to “clean up any messes” by catching errors that occur
  - the **`try`** suite code reflects what you want to do and the **`except`** code what you want to do on error
  - cleaner separation!

Python Likes EAFP

- some Python programmers support the ***EAFP*** approach
  - run the code, let the **`except`** suites deal with the errors
  - don't check first

```
# check whether int conversion will raise an error, two examples.
# Python Idioms, http://jaynes.colorado.edu/PythonIdioms.html

#LBYL, test for the problematic conditions
def test_lbyl (a_str):
    if not isinstance(a_str, str) or not a_str.isdigit:
        return None
    elif len(a_str) > 10:    #too many digits for int conversion
        return None
    else:
        return int(a_str)

#EAFP, just try it, clean up any mess with handlers
def test_eafp(a_str):
    try:
        return int(a_str)
    except (TypeError, ValueError, OverflowError): #int conversion failed
        return None
```

Extensions to the Basic Exception Model

`finally` Suite, Version 2

- you can add a **`finally`** suite at the end of the **`try`**/**`except`** group
- the **`finally`** suite is run as you exit the **`try`**/**`except`** suite, ***no matter whether an error occurred or not***
  - even if an exception raised in the **`try`** suite was not handled!
- gives you an opportunity to clean up as you exit the **`try`**/**`except`** group

`finally` and `with`

- `finally` is related to a `with` statement
  - creates a context (the `try` suite)
  - has an exit, namely execute the `finally` suite

`else`, Version 3

- one way to think about things is to think of the **`try`** as a kind of condition (an exception condition) and the **`except`** as conditional clauses
- if an exception occurs, then you match the exception
- the **`else`** clause covers the non-exception condition
  - it runs when the **`try`** suite does not encounter an error

The Entire `try`

```
try:
    code to try
except PythonError1:
    exception code
except PythonError2:
    exception code
except:
     default except code
else:
    non exception case
finally:
    clean up code
```


Code Listing 14-7

```
# all aspects of exceptions

def process_file(data_file):
    """Print each line of a file with its line number."""
    count = 1
    for line in data_file:
        print('Line ' + str(count) + ': ' + line.strip())
        count = count + 1

while True:    # loop forever: until "break" is encountered
    filename = input('Input a file to open: ')
    try:
        data_file = open(filename)
    except IOError:                        # we get here if file open failed
        print('Bad file name; try again')
    else:
        # no exception so let's process the file
        print('Processing file',filename)
        process_file(data_file)
        break       # exit "while" loop (but do "finally" block first)
    finally:        # we get here whether there was an exception or not
        try:
            data_file.close()
        except NameError:
            print('Going around again')

print('Line after the try-except group')
```

Creating and Raising Your Own Exceptions

Invoking an Exception with `raise`

- you can choose to invoke the exception system anytime you like with the **`raise`** command

```
raise MyException
```

- you can check for odd conditions, **`raise`** them as an error, then catch them
- they must be part of the existing exception hierarchy in Python

Non-Local Catch

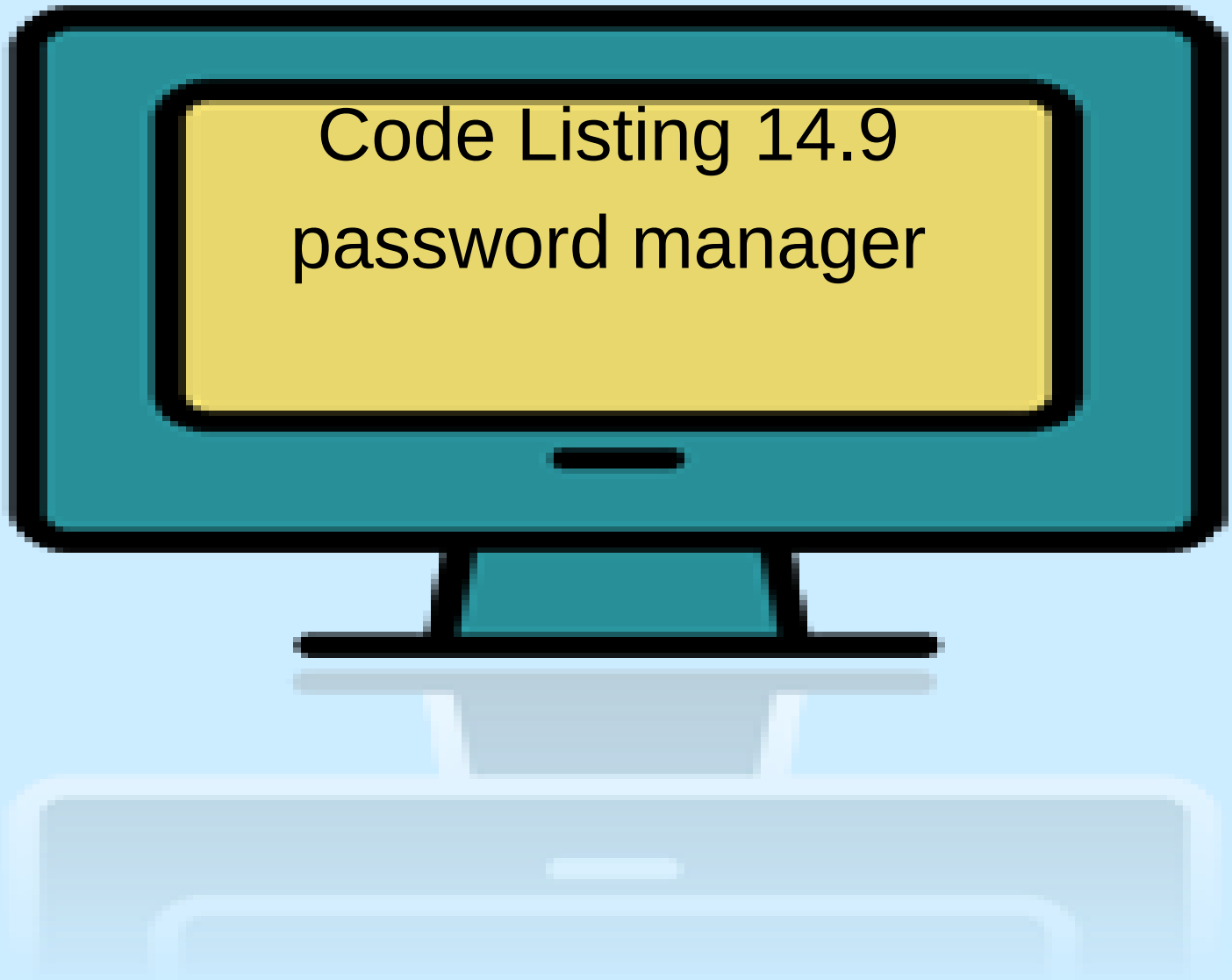
- interestingly, the **`except`** suite does not have to be right next to the try suite
- in fact, the **`except`** that catches a **`try`** error can be in another function
- Python maintains a chain of function invocations
  - if an error occurs in a function and it cannot catch it, it looks to the function that called it to catch it

Make Your Own Exception

- you can make your own exception
- exceptions are classes, so you can make a new exception by making a new subclass

```
class MyException (IOError):
    pass
```

- when you make a new class, you can add your own exceptions


Code Listing 14.9
password manager

```
1  import string
2
3  # define our own exceptions
4  class NameException (Exception):
5      ''' For malformed names'''
6      pass
7  class PasswordException (Exception):
8      ''' For bad password '''
9      pass
10 class UserException (Exception):
11     ''' Raised for existing or missing user '''
12     pass
13
14 def check_pass(pass_str, target_str):
15     """Return True, if password contains characters from target."""
16     for char in pass_str:
17         if char in target_str:
18             return True
19     return False
20
21 class PassManager(object):
22     """A class to manage a dictionary of passwords with error checking."""
23     def __init__(self, init_dict=None):
24         if init_dict==None:
25             self.pass_dict={}
```

```
26          else:
27              self.pass_dict = init_dict.copy()
28
29      def dump_passwords(self):
30          return self.pass_dict.copy()
31
32      def add_user(self,user):
33          """Add good user name and strong password to password dictionary."""
34          if not isinstance(user,str) or not user.isalnum():
35              raise NameException
36          if user in self.pass_dict:
37              raise UserException
38          pass_str = input('New password:')
39          # strong password must have digits, uppercase and punctuation
40          if  not (check_pass(pass_str, string.digits) and\
41                       check_pass(pass_str, string.ascii_uppercase) and\
42                       check_pass(pass_str, string.punctuation)):
43              raise PasswordException
44
45      def validate(self,user):
46          """Return True, if valid user and password."""
47          if not isinstance(user,str) or not user.isalnum():
48              raise NameException
49          if user not in self.pass_dict:
50              raise UserException
51          password = input('Passwd:')
52          return self.pass_dict[user]==password
```