

Python Workshop

Process Flow

Joseph D. Hughes

U.S. Geological Survey
Florida Water Science Center, Tampa, Florida USA

USGS National Groundwater Workshop, August 2012



Outline

Overview

- Much of what is useful to do in Python is reading files, manipulating the data, and writing out results in another format
- Python and Numpy provide ways to read and write ASCII and binary files. We will focus on ASCII files

Background Information

Process flow control resources:

<http://docs.python.org/tutorial/controlflow.html>

while, continue, and break

ProcessFlowExamples.py

Import data from an external file and iterate over data using **while** and **print** last entry.

```
1 import numpy as np
2 ##load flow data
3 q = np.genfromtxt( 'USInflow.dat', skip_header=1 )
4 ##determine sizes
5 ntimes, ncol = q.shape[0], q.shape[1]
6 print 'Number of times: {0:10d}\nNumber of entries: {1:10d}'.format( ntimes, ncol )
7 ##while iteration with break and continue
8 ipos = 0
9 while True:
10     ##only print last line
11     if ipos+1 < ntimes:
12         ##increment ipos by one
13         ipos += 1
14         continue
15     ##print data
16     print '{0:25s}: {1}, {2}, {3}'.format( 'while iteration', ipos+1, q[ipos,0], q[ipos,1] )
17     ##terminate after printing last element
18     break
```

range iterator and continue

ProcessFlowExamples.py

Import data from an external file and iterate over data using **range** and **print** last entry.

```
1 import numpy as np
2 ##--load flow data
3 q = np.genfromtxt( 'USInflow.dat', skip_header=1 )
4 ##--determine sizes
5 ntimes, ncol = q.shape[0], q.shape[1]

      :

19 ##--range iterator - range creates a list
20 for ipos in range(0,ntimes):
21     ##--only print last line
22     if ipos+1 < ntimes:
23         continue
24     ##--print data
25     print '{0:25s}: {1}, {2}, {3}'.format( 'range iteration', ipos+1, q[ipos,0], q[ipos,1] )
```

xrange iterator and continue

ProcessFlowExamples.py

Import data from an external file and iterate over data using **xrange** and **print** last entry.

```
1  import numpy as np
2  ##--load flow data
3  q = np.genfromtxt( 'USInflow.dat', skip_header=1 )
4  ##--determine sizes
5  ntimes, ncol = q.shape[0], q.shape[1]

      :
      :
      :
26  ##--xrange iterator - xrange is a generator
27  for ipos in xrange(0,ntimes):
28      ##--only print last line
29      if ipos+1 < ntimes:
30          continue
31      ##--print data
32      print '{0:25s}: {1}, {2}, {3}'.format( 'xrange iteration', ipos+1, q[ipos,0], q[ipos,1] )
```

in iterator and continue

ProcessFlowExamples.py

Import data from an external file and iterate over data using **in** iterator and **print** last entry.

```
1  import numpy as np
2  ##--load flow data
3  q = np.genfromtxt( 'USInflow.dat', skip_header=1 )
4  ##--determine sizes
5  ntimes, ncol = q.shape[0], q.shape[1]

      :

33 ##--element iterator
34 ipos = 0
35 for t in q:
36     ##--increment ipos by one
37     ipos += 1
38     ##--only print last line
39     if ipos < ntimes:
40         continue
41     ##--print data
42     print '{0:25s}: {1}, {2}, {3}'.format( 'element iteration', ipos, t[0], t[1] )
```


enumerate iterator and continue

ProcessFlowExamples.py

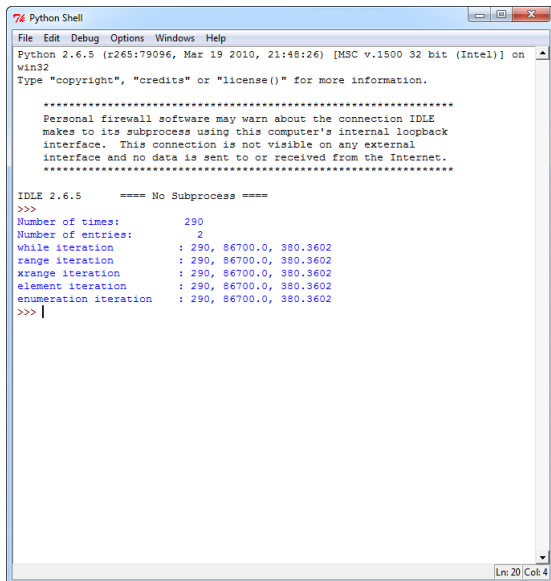
Import data from an external file and iterate over data using **enumerate** iterator and **print** last entry.

```
1  import numpy as np
2  #--load flow data
3  q = np.genfromtxt( 'USInflow.dat', skip_header=1 )
4  #--determine sizes
5  ntimes, ncol = q.shape[0], q.shape[1]

      :

43  #--enumeration iterator
44  for ipos,t in enumerate(q):
45      #--only print last line
46      if ipos+1 < ntimes:
47          continue
48      print '{0:25s}: {1}, {2}, {3}'.format( 'enumeration iteration', ipos+1, t[0], t[1] )
```

ProcessFlowExamples.py output



```
Python 2.6.5 (r265:79096, Mar 19 2010, 21:48:26) [MSC v.1500 32 bit (Intel)] on win32
Type "copyright", "credits" or "license()" for more information.

*****
Personal firewall software may warn about the connection IDLE
makes to its subprocess using this computer's internal loopback
interface. This connection is not visible on any external
interface and no data is sent to or received from the Internet.
*****

IDLE 2.6.5      ==== No Subprocess ====
>>>
Number of times:      290
Number of entries:    2
while iteration       : 290, 86700.0, 380.3602
range iteration       : 290, 86700.0, 380.3602
xrange iteration      : 290, 86700.0, 380.3602
element iteration     : 290, 86700.0, 380.3602
enumeration iteration : 290, 86700.0, 380.3602
>>> |
```