

# Python Workshop

## Process Flow

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## Background Information

- Example python script `ProcessFlowExamples.py`
- Process flow control resources:  
<http://docs.python.org/tutorial/controlflow.html>

## while, continue, and break

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( '..\\data\\ProcessFlow.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

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( '..\\data\\ProcessFlow.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**

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( '..\\data\\ProcessFlow.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

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( '..\\data\\ProcessFlow.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**

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( '..\\data\\ProcessFlow.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] )
```



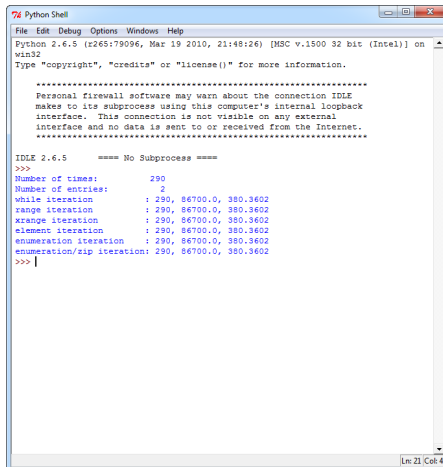
## enumerate iterator with zip and **continue**

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

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

55 #--enumeration iterator with zip
56 v0, v1 = np.copy( q[:,0] ), np.copy( q[:,1] )
57 for ipos, ( t0, t1 ) in enumerate( zip( v0,v1 ) ):
58     #--only print last line
59     if ipos+1 < ntimes:
60         continue
61     print '{0:25s}: {1}, {2}, {3}'.format( 'enumeration/zip iteration', ipos+1, t0, t1 )
```

# 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
enumeration/zip iteration: 290, 86700.0, 380.3602
>>> |
```

## Run a simple example

- open the command line
- type `python`
- enter the text listed below

```
import numpy as np
t0 = np.arange(0,11,1)
t1 = -np.arange(0,11,1)
for ipos in range(0,10):
    print t0[ipos], t1[ipos]
```

- then try

```
for ipos, (v1,v2) in enumerate( zip(t0,t1) ):
    print v1, v2
```



```
C:\Windows\system32\cmd.exe - python
D:\Data\Users\ldhughes\Projects\Pylab\MatPresentations\python>python
Python 2.4.5 (24517006, Mar 19 2010, 21:40:26) [MSC v.1500 32 bit (Intel)] on
win32
Type "help", "copyright", "credits" or "license" for more information.
>>> import numpy as np
>>> t0 = np.arange(0,11,1)
>>> t1 = -np.arange(0,11,1)
>>> for ipos in range(0,10):
...     print t0[ipos], t1[ipos]
...
0 0
1 -1
2 -2
3 -3
4 -4
5 -5
6 -6
7 -7
8 -8
9 -9
>>> for ipos,(v1,v2) in enumerate( zip(t0,t1) ):
...     print v1, v2
...
0 0
1 -1
2 -2
3 -3
4 -4
5 -5
6 -6
7 -7
8 -8
9 -9
10 -10
>>>
```