Demo document with computer code

HPL

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1 Data file

Suppose we have some data in a file. The final result of including this file with `@@@CODE mydat.txt` (which implies a code environment starting with `!bc dat`) looks like this:

```
1    #      A           B           C           D           E
2        -0.5253     -0.9315     -0.3427     -0.1613     -0.8472
3        -0.9740     -0.2558     -0.5622     -0.7635     -0.0914
4         0.9216      0.7702     -0.4818      0.2155      0.2967
```

2 Complete program and terminal output

The following program (which breaks a page) reads the data in the file and performs analysis (typeset with `!bc pypro`):

```python
1    import numpy as np
2
3    def readfile(filename):
4        """Read tabular data from file and return as numpy array."""
5        f = open(filename, 'r')
6        data = []  # list of rows in table
7        for line in f:
8            if line.startswith('#'):
9                continue   # drop comment lines
10           numbers = [float(w) for w in line.split()]
11           data.append(numbers)
12       return np.array(data)
13
```

```
14   def analyze(data):
15       """Return statistical measures of an array data."""
16       return np.mean(data), \
17              np.std(data), \
18              np.corrcoef(data)
19
20   if __name__ == '__main__':
21       data = readfile('mydat.txt')
22       # Treat each column as a variable
23       m, s, c = analyze(data.transpose())
24       print """
25   mean=%f
26   st.dev=%f
27   correlation matrix:
28   %s
29   """ % (m, s, c)
```

The output becomes (typeset with `!bc sys`):

```
1    Terminal> python fileread.py
2
3    mean=-0.006005
4    st.dev=0.583542
5    correlation matrix:
6    [[ 1.          0.0509676   0.52406366  0.20964645  0.1574504 ]
7     [ 0.0509676   1.         -0.30920845 -0.12129049  0.7611538 ]
8     [ 0.52406366 -0.30920845  1.          0.49355806 -0.42263817]
9     [ 0.20964645 -0.12129049  0.49355806  1.         -0.38286589]
10    [ 0.1574504   0.7611538  -0.42263817 -0.38286589  1.        ]]
```

3   Code snippet

Fortran 77 is also sometimes handy. Snippets in that language are typeset inside
`!bc fcod` environments.

Fortran code box.

$$r_i = ca_i, \quad i = 1, \ldots, n$$

```
1          subroutine process(a, n, c, r)
2   C      This subroutine returns array r = c*a
3          integer n
4          real*8 a(n), c, r(n)
5          integer i
6          do i = 1,n
7             r(i) = c*a(i)
8          end do
9          return
0          end
```