

# 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:

| # | A       | B       | C       | D       | E       |
|---|---------|---------|---------|---------|---------|
|   | -0.5253 | -0.9315 | -0.3427 | -0.1613 | -0.8472 |
|   | -0.9740 | -0.2558 | -0.5622 | -0.7635 | -0.0914 |
|   | 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`):

```
from future import print_function
import numpy as np

def readfile(filename):
    """Read tabular data from file and return as numpy array."""
    f = open(filename, 'r')
    data = [] # list of rows in table
    for line in f:
        if line.startswith('#'):
            continue # drop comment lines
        numbers = [float(w) for w in line.split()]
        data.append(numbers)
    return np.array(data)

def analyze(data):
    """Return statistical measures of an array data."""
    return np.mean(data), \
           np.std(data), \
           np.corrcoef(data)

if __name__ == '__main__':
    data = readfile('mydat.txt')
    # Treat each column as a variable
```

```

    m, s, c = analyze(data.transpose())
    print("""
mean=%f
st.dev=%f
correlation matrix:
%s
""") % (m, s, c))

```

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

```
Terminal> python fileread.py
```

```

mean=-0.006005
st.dev=0.583542
correlation matrix:
[[ 1.          0.0509676  0.52406366  0.20964645  0.1574504 ]
 [ 0.0509676   1.         -0.30920845 -0.12129049  0.7611538 ]
 [ 0.52406366 -0.30920845  1.         0.49355806 -0.42263817]
 [ 0.20964645 -0.12129049  0.49355806  1.         -0.38286589]
 [ 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.

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

```

C      subroutine process(a, n, c, r)
      This subroutine returns array r = c*a
      integer n
      real*8 a(n), c, r(n)
      integer i
      do i = 1,n
        r(i) = c*a(i)
      end do
      return
      end

```