

Introduction to Parallel Scientific Computing [ME5470]

Assignment 1

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Q1 - A

For $n = 4000$, the file sizes were:

```
$ du -sh *.out
320M    array_004000_asc.out
123M    array_004000_bin.out
```

Comment: Size of ASCII file is **larger** than Binary file.

Q1 - B

For $n = 4000$, size of the array in memory:

$$\text{sizeof(double)} \times n^2 = 8 \times (4000)^2 = 128,000,000 \text{ bytes}$$

$$\approx 122 \text{ MB}$$

Comment: The size of binary file is close to the in-memory size, while the size of ASCII file is significantly larger. This is because ASCII file stores data in human readable format having adding overhead for character representation, space, commas, newlines.

- **Binary format** is preferred for **large dataset** due its compactness and **memory efficiency**.
- **ASCII format** can be used for ease of inspection and **debugging** but at the cost of **increased file size** and slower execution times

Q2

Results:

Input File	Is Eigenvector?	Eigenvalue
vec000003000001.in	Yes	-6.000000e+00
vec000003000002.in	Yes	-6.000000e+00
vec000003000003.in	Yes	-1.000000e+00
vec000003000004.in	Not an eigenvector	-

Table 2: Eigenvector Results, for n = 3

Input File	Is Eigenvector?	Eigenvalue
vec000005000001.in	Yes	2.680981e-01
vec000005000002.in	Not an eigenvector	-
vec000005000003.in	Yes	9.868750e-01
vec000005000004.in	Yes	1.399039e+00

Table 3: Eigenvector Results, for n = 5

Input File	Is Eigenvector?	Eigenvalue
vec000050000001.in	Not an eigenvector	-
vec000050000002.in	Yes	4.796282e-01
vec000050000003.in	Yes	1.337887e+00
vec000050000004.in	Not an eigenvector	-

Table 4: Eigenvector Results, for n = 50

Input File	Is Eigenvector?	Eigenvalue
vec000080000001.in	Yes	3.330178e-01
vec000080000002.in	Yes	4.931420e-01
vec000080000003.in	Yes	9.392745e-01
vec000080000004.in	Not an eigenvector	-

Table 5: Eigenvector Results, for n = 80