ME5470: Introduction to Parallel Scientific Computing

Homework 1

-A.Padmaprabhan

ME22BTECH11001

Question 1.

a. Sizes of 'array_004000_asc.out' is 327.637MB and size of 'array_004000_bin.out' is 125MB.

b. Size of array in memory: n=4000

n^2=160,00,000

double type takes 8 bytes

Total no. of bytes, n^2x8= 160,00,000x8=1280,00,000 bytes= 128MB

Size in memory v/s size in disk:

- Size of array in memory is 128MB, since all elements are directly stored as double values in memory.
- Size of array in disk can vary based on file format. If it is saved as binary file (.bin), its size will remain as 128MB, as the raw binary representation is directly written to the file.
- When saved in ASCII format, using "w" mode in C the size on disk will depend on how the double type is formatted as text. Since ASCII stores data as human-readable characters, it would require more storage. Each number would require about 20 bytes on average in ASCII format. Calculating, we get

  160,00,000x20=3200,00,000 bytes = 320MB

- Hence, binary format is best suited for storing large data, since it requires the least space to be stored on disk.