Q) Discuss the differences between the two and the optimal choice of achieving parallelism/reducing run time for arrays of different sizes.

Ans) For smaller array size such as 2000000 mentioned in this example, the pure OpenMP implementation is faster than the hybrid Open+MPI implementation. The reason for the difference is that the working set seems to fit within the memory of a single node. In such cases, the program is compute bound and not memory bound and for such scenario, pure OpenMP implementation seems to be the right choice. Also, Pure OpenMP approach will be highly efficient in shared memory systems. On the other hand, if the application is heavily memory bound, then the hybrid approach will deliver better performance if partitioning of data can be done. In such cases, each cluster can independently compute the partial results with its partitioned working set and hence achieve better performance. Also, in distributed systems, the hybrid OpenMP+MPI approach will perform faster.