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* HPC - Assignment - 01 *

* **Aim:-** Vector & matrix operations -
Design parallel algorithm to
(1) Add two large vectors
(2) Multiply vector & matrix
(3) Multiply two NXN arrays using n^2 ~~operat~~ processors.

* **Objectives:-** (1) To understand vector & matrix operations.
(2) To implement parallel algorithm to perform matrix & vector operations.

* **Outcomes:-** Understood vector & matrix operation using parallel algorithm.

* **Software Requirements:-** c++ programming

* **Hardware Requirement:-** Mic, lenovo think centon m100, ci3 6100, 6th gen, H81, 4GB RAM, 500GB HDD.

* **Theory:-** While executing the parallel algorithm of matrix vectors multiplication it is necessary to distribute not only the matrix A, but also vector b, and the result vector c.

- Add two large vectors:-
  When added together in this diff. order these same three vectors still produce a resultant with the same magnitude & direction as before. The order in which vectors are added using head to tail methods.

- Vectors & matrix multiplication :-
  This is the same as standard matrix multiplications.

Example -

$$X = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix} * \begin{bmatrix} 9 \\ 8 \\ 7 \end{bmatrix}$$

$$X = \begin{bmatrix} 1\times9 + 2\times8 + 3\times7 \\ 4\times9 + 5\times8 + 6\times7 \end{bmatrix}$$

$$X = \begin{bmatrix} 46 \\ 118 \end{bmatrix}$$

* **Conclusion** :-
  studied about vector & matrix operations to design parallel algorithm.