CS433-Parallel and Distributed Computing

Assignment#1 on OpenMP Programming

1. Please write a program in OpenMP, to compute the sum of a vector,

$$\boldsymbol{sum}(\boldsymbol{x}) = \sum \boldsymbol{x_i}$$

2. Please implement a function to compute matrix multiplication in OpenMP.
3. (random_generator) Consider two students playing an "interesting" game. The game starts with integer SUM=0. In each round, each students generate an integer in [-50, 100] and adds to SUM in turn. The first student makes the SUM>1000 wins the game.
   Now, please write programs with OpenMP to simulate the game.
4. (consumer_producer) Consumer-Producer problem is a classical threads synchronization problem. Several producers are producing products to a FIFO pipe while some consumers are consuming them on the other side. In this task, please simulate this process with random number(1-10) of producers and consumers with OpenMP.

NOTICE:

1. You'd better use Ubuntu[1] and you have to write a **makefile** to compile your code.
2. For the first two tasks, you are suggested to use template if possible to become generic. Also, it should be a standalone function to perform the computation, i.e., everybody can reuse your function to do the similar job with variable configurations.
   e.g. For the matrix multiplication task, the prototype of the function should be like this:
   template<typename Type> int MatrixMultiplication(Type *pMatA, Type *pMatB, Type *pMatC, int M, int N, int K);
3. Send your final version to TA at Shine1999@sjtu.edu.cn. You should archive your source code and makefile with StudentID_Name_HW1.tar.gz(or any archive file types). Do not include binary file.
4. Should you have any questions, please feel free to contact TA at Shine1999@sjtu.edu.cn.

Reference

[1] https://ubuntu.com/tutorials/working-with-visual-studio-code-on-ubuntu-on-wsl2
[2] https://www.geeksforgeeks.org/openmp-introduction-with-installation-guide