

GUIDELINES

1. Try to write a clean program with enough comments.
2. At the beginning of the file, use block comments to write details about name, roll no, assignment details, input required and output generated. Also put the compilation [should be WARNINGS/Errors free] and execution sequence under the block comment.
3. The name of the file should be as per the following format.

<Last two digit of your Roll>_<First Name>_<Last Name>
[For Lateral and Repeat, prefix the Roll No with 'L' and 'R' respectively]
4. The type of the file should be .c
5. The assignment files should be uploaded using google form which I will email you later.
6. While coding, always use indentation of 4 spaces.
7. Blocks of code should be separated by a newline.
8. Always use command line argument handling to take inputs.
9. Late Submission will incur penalties.
10. Duplicate assignments will incur penalties.
[Marks will be allocated proportionately]
11. Not adhering to any of these guidelines will incur penalties.
12. For the description of any system/library call use man/tldr command.
13. Make sure you use meaningful variable names rather than a/b/c etc.
14. Attach the program output as a comment to the source file.

Total Marks – 100
Matrix Multiplication Using a Parallel Algorithm

The objective of this assignment is to write a C program which will do matrix multiplication using a parallel algorithm. The two input matrices are A and B. The resultant matrix after multiplication is C. The parallel algorithm which will be used is already known to you and can be found in the PDF '15_Parallel_Algorithm' in the 'Computer Org & Arch' course material. For the explanation of the PDF you can watch the corresponding recording.

Your program will accept three arguments; the first one is for creating number of parallel threads, the second one is the dimension of the square matrix and the third one is about displaying matrices. The value of the first argument should be equal to the number of CPUs/Logical processors in the system. The value of the 2nd argument should be around 1000/1500/2000. The value of the third argument should be either 1 or 0. If it is 1 then your program will display all matrices at the end. If the value of the third argument is 0, then no matrix will be displayed. All these three arguments should be taken from command line (using argc/argv etc.).

Each of the elements of each of the square matrix should be of type 'Unsigned int' and should be initialized to either 1 or 0. You have to also print the total time required to do the matrix multiplication. For the measurement of time, use 'gettimeofday' call. Please note that, total time should not include matrix initialisation time. You have to attach this timing information in the source file using block comment. You have to print the matrices (for dimension 4) and attach this also to the source file.

You need to use Thread programming approach to write this program of Parallel Matrix Multiplication. Please consult the file thr.c to understand how parallel program can be written using Pthread.

To know that you have successfully written a parallel program, one has to execute certain diagnostics/statistics command from command line. Two of these commands are 'top' and 'mpstat'. You have to attach the output of the mpstat command to the source file which will clearly show that all the CPUs were fully loaded while running the parallel algorithm.