

CENG 493 Special Topics in Computer Engineering: Cluster Computing

Homework 2/032

Regulations:

- Due Date: 7 May, 2004
- Submission: Electronically. You will be submitting your program source codes, Makefile and all necessary data files through a compressed tar file which you will name as **hw2.tgz** by using the homework submission link <https://submit.ceng.metu.edu.tr>
- Team: There is no teaming up. The homework has to be done and turned in individually.

Problem:

You are expected to write a simple parallel application that reads two matrices from a file and performs parallel matrix multiplication. You can use [PVM](#) library or [MPI](#) for this homework. Note that only PVM is available in the department hosts. Programs should be written in C or C++. There are some suggestions on how to partition the job of matrix multiplication in your text book pages 155-160. You should choose the partitioning algorithm best suitable for PVM and given matrix size.

Server:

The program, named PARMATMUL will be a server that reads two matrices from a file name "matrix.dat". It should create given number of clients and partition the job to these clients and join the result. The result matrix should be written to the output file.

The PARMATMUL program can take three arguments:

1. The number of processes to be used. If no process number is given, the default value should be used which is **8**.
2. An input file name. If no file name is given, the default value should be used which is **matrix.dat**
3. An output file name. If no file name is given, the default value should be used which is **output.dat**

You will be reading the matrices from a binary file which starts with three integers representing DIM1, DIM2 and DIM3. The dimensions of the first matrix will be DIM1xDIM2, while the dimensions of the second matrix will be DIM2xDIM3. After three integers, there will be DIM1xDIM2 double numbers representing the elements of the first

matrix in rowwise order and DIM2xDIM3 double numbers representing the elements of the second matrix in rowwise order.

The resulting matrix should be written to the output file as 2 integers representing the dimensions and DIM1xDIM3 double numbers representing the elements of the result matrix in rowwise order.

Notes:

- You can assume that the dimensions of the given matrices will be bigger than 500 and smaller than 1000.
- A sample data file will be provided from the course web page.
- The dimensions of the first matrix is DIM1xDIM2, while the dimensions of the second matrix is DIM2xDIM3.
- Provide your programs with a makefile that can compile them by a simple make command.
- Put all the necessary files in the tar file. Do not forget to compress the tar file with gzip command before sending.
- Direct all questions about the homework to the newsgroup of the course so all students can follow.
- To explain how the arguments are to be taken, either add a -h argument or provide a readme file.