Programming Assignment -2

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Problem Statement

To multiply two matrices, the number of columns of first matrix should be equal to the number of rows to second matrix. This program displays the error until the number of columns of first matrix is equal to the number of rows of second matrix.

Problem Approach

```
int main(int argc, char *argv[])
{
MPI_Init (&argc, &argv);
MPI_Comm_rank(MPI_COMM_WORLD, &me);
MPI_Comm_size(MPI_COMM_WORLD, &p);
/* Data distribution */
/* Computation */
/* Result gathering */
MPI_Finalize();
}
```

Basic Flow

Algorithm: Matrix Multiplication using MPI_Send and MPI_Receive functions

Input : Two input files with mxn matrix values

Output : Cartesian product of two Matrices

Flow:

Step 1:

Change the input files and update the rows and columns accordingly

Step 2:

Compile the program using the command

$$mpicc + + mpi - project.cpp \ - o \ p1$$

Step 3:

Run the program with required number of processors

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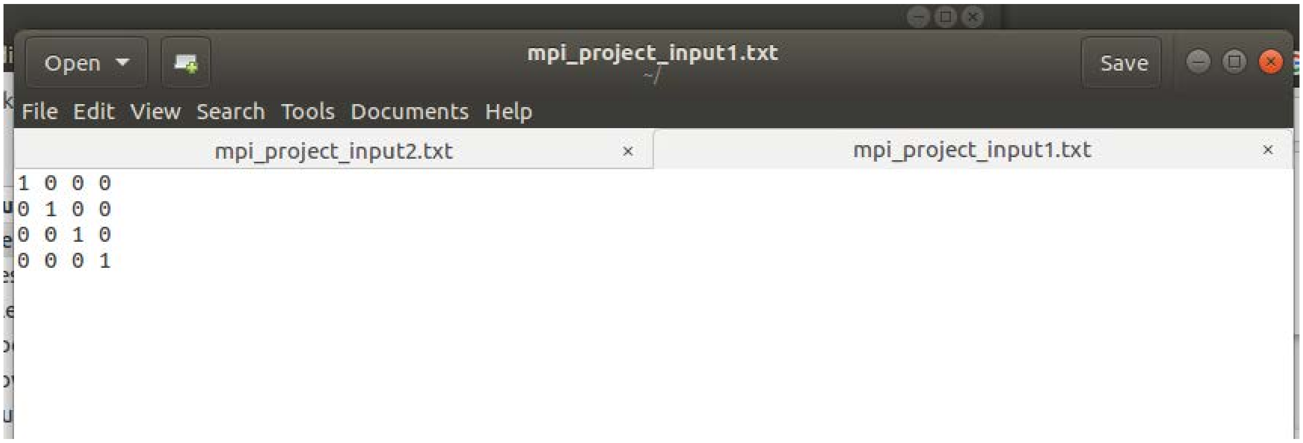
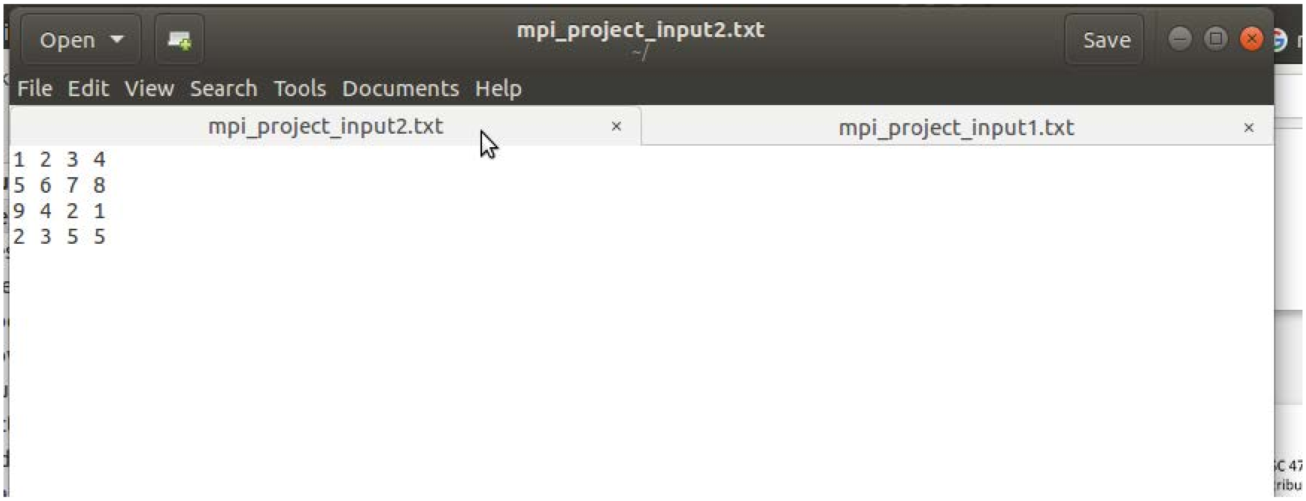
$$mpirun\ -n\ X\ ./p1$$

Screenshots



```
1 0 0 0
0 1 0 0
0 0 1 0
0 0 0 1
```

Figure 1: Matrix A (Input File -1)



```
1 2 3 4
5 6 7 8
9 4 2 1
2 3 5 5
```

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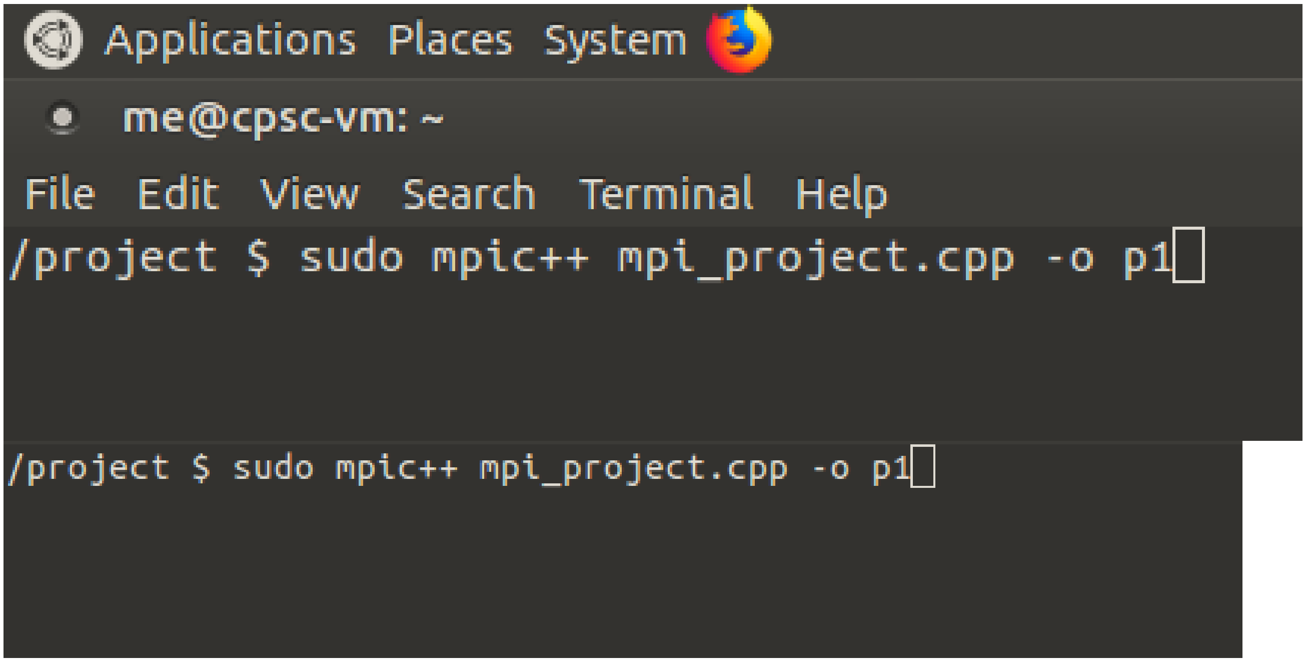
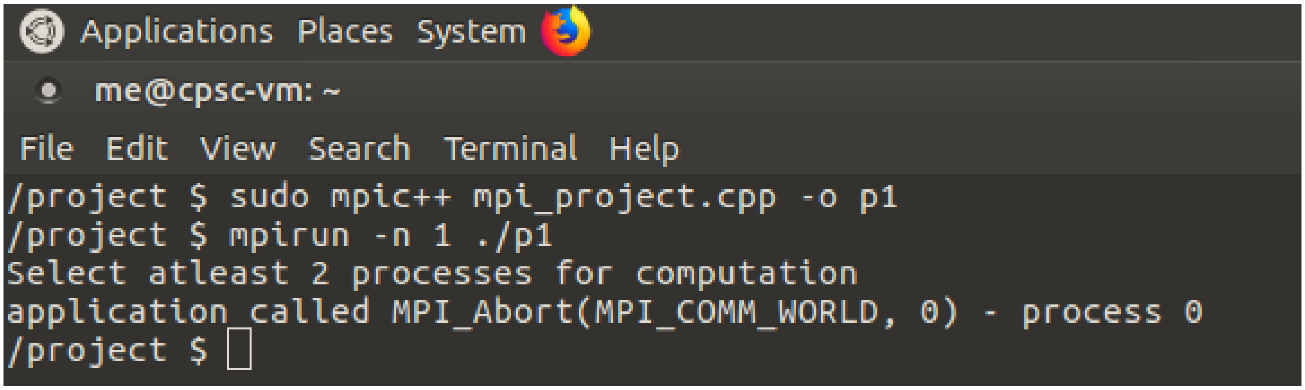
Figure 1: Matrix B (Input File -2)


Applications Places System
me@cpsc-vm: ~
File Edit View Search Terminal Help

```
/project $ sudo mpic++ mpi_project.cpp -o p1
```

```
/project $ sudo mpic++ mpi_project.cpp -o p1
```

Figure 3: Compilation


Applications Places System
me@cpsc-vm: ~
File Edit View Search Terminal Help

```
/project $ sudo mpic++ mpi_project.cpp -o p1
/project $ mpirun -n 1 ./p1
Select atleast 2 processes for computation
application called MPI_Abort(MPI_COMM_WORLD, 0) - process 0
/project $ 
```

Figure 4: Number of processors should be greater than 2

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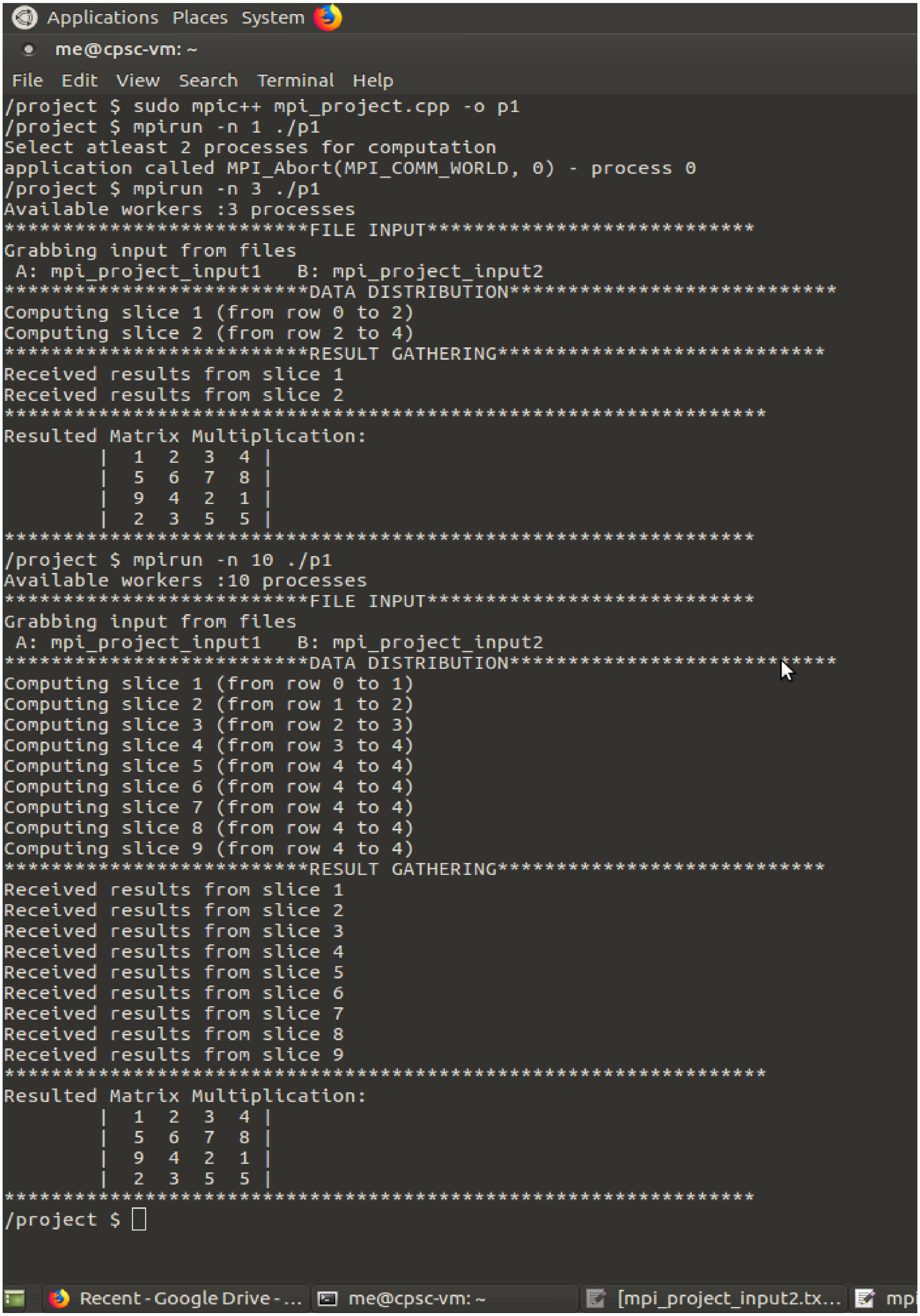
Applications Places System
me@cpsc-vm: ~
File Edit View Search Terminal Help
Recent - Google Drive - ...
me@cpsc-vm: ~
[mpi_project_input2.tx...
mpi

```
/project $ sudo mpic++ mpi_project.cpp -o p1
/project $ mpirun -n 1 ./p1
Select atleast 2 processes for computation
application called MPI_Abort(MPI_COMM_WORLD, 0) - process 0
/project $ mpirun -n 3 ./p1
Available workers :3 processes
**************************FILE INPUT****************************
Grabbing input from files
 A: mpi_project_input1   B: mpi_project_input2
**************************DATA DISTRIBUTION****************************
Computing slice 1 (from row 0 to 2)
Computing slice 2 (from row 2 to 4)
**************************RESULT GATHERING****************************
Received results from slice 1
Received results from slice 2
*****************************************************************
Resulted Matrix Multiplication:
        |  1  2  3  4 |
        |  5  6  7  8 |
        |  9  4  2  1 |
        |  2  3  5  5 |
****************************************************************
/project $ mpirun -n 10 ./p1
Available workers :10 processes
**************************FILE INPUT****************************
Grabbing input from files
 A: mpi_project_input1   B: mpi_project_input2
**************************DATA DISTRIBUTION****************************
Computing slice 1 (from row 0 to 1)
Computing slice 2 (from row 1 to 2)
Computing slice 3 (from row 2 to 3)
Computing slice 4 (from row 3 to 4)
Computing slice 5 (from row 4 to 4)
Computing slice 6 (from row 4 to 4)
Computing slice 7 (from row 4 to 4)
Computing slice 8 (from row 4 to 4)
Computing slice 9 (from row 4 to 4)
**************************RESULT GATHERING****************************
Received results from slice 1
Received results from slice 2
Received results from slice 3
Received results from slice 4
Received results from slice 5
Received results from slice 6
Received results from slice 7
Received results from slice 8
Received results from slice 9
*****************************************************************
Resulted Matrix Multiplication:
        |  1  2  3  4 |
        |  5  6  7  8 |
        |  9  4  2  1 |
        |  2  3  5  5 |
****************************************************************
/project $ 
```