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CPSC 474-01 Project 2

Topic: Compressing a sparse matrix

```
1  # 474-Project-2
2
3  Project 2: Implement a distributed algorithm using MPI
4
5  Topic: Compressing a sparse matrix
6
7  Group members:
8
9  Andy Duong aqduong@csu.fullerton.edu
10 |
```

Program Pseudocode:

Declare necessary variables

Root process read in matrix from file

Root process broadcasts matrix info to all other processes

All processes look through their assigned portion of the matrix for nonzero values

Gather info on nonzero values back to root node

Add nonzero values to linked list

How to Run:

1. Extract project into folder
2. Navigate to project directory
3. Add desired input to file input.txt
4. Open terminal at project directory
5. Run command: `mpic++ main.cpp`
6. Run command: `mpirun -n 4 ./a.out`
7. Results will be displayed in terminal

Notes:

1. Don't leave an empty line at bottom of input file
2. Program accepts any number of processes greater than 1

Screenshots of Code Executing

2 Processes

```
CPSC474_Project — -zsh — 80x20
[andyduong@Andys-MacBook-Pro CPSC474_Project % mpic++ main.cpp
[andyduong@Andys-MacBook-Pro CPSC474_Project % mpirun -np 2 ./a.out
Value : 3 Row: 0 Column: 5
Value : 1 Row: 0 Column: 10
Value : 4 Row: 1 Column: 0
Value : 5 Row: 1 Column: 4
Value : 2 Row: 2 Column: 5
Value : 23 Row: 3 Column: 6
Value : 21 Row: 4 Column: 0
Value : 10 Row: 4 Column: 5
Value : 2 Row: 5 Column: 0
Value : 5 Row: 5 Column: 8
Value : 30 Row: 6 Column: 4
Value : 1 Row: 6 Column: 10
Value : 1 Row: 7 Column: 4
Value : 5 Row: 7 Column: 5
Value : 6 Row: 7 Column: 9
Value : 6 Row: 8 Column: 0
Value : 1 Row: 9 Column: 0
Value : 8 Row: 9 Column: 5
```

4 Processes

```
CPSC474_Project — -zsh — 80x20
[andyduong@Andys-MacBook-Pro CPSC474_Project % mpic++ main.cpp
[andyduong@Andys-MacBook-Pro CPSC474_Project % mpirun -np 4 ./a.out
Value : 3 Row: 0 Column: 5
Value : 1 Row: 0 Column: 10
Value : 4 Row: 1 Column: 0
Value : 5 Row: 1 Column: 4
Value : 2 Row: 2 Column: 5
Value : 23 Row: 3 Column: 6
Value : 21 Row: 4 Column: 0
Value : 10 Row: 4 Column: 5
Value : 2 Row: 5 Column: 0
Value : 5 Row: 5 Column: 8
Value : 30 Row: 6 Column: 4
Value : 1 Row: 6 Column: 10
Value : 1 Row: 7 Column: 4
Value : 5 Row: 7 Column: 5
Value : 6 Row: 7 Column: 9
Value : 6 Row: 8 Column: 0
Value : 1 Row: 9 Column: 0
Value : 8 Row: 9 Column: 5
```

8 Processes

```
CPSC474_Project — -zsh — 80x20
[andyduong@Andys-MacBook-Pro CPSC474_Project % mpic++ main.cpp
[andyduong@Andys-MacBook-Pro CPSC474_Project % mpirun -np 8 ./a.out
Value : 3 Row: 0 Column: 5
Value : 1 Row: 0 Column: 10
Value : 4 Row: 1 Column: 0
Value : 5 Row: 1 Column: 4
Value : 2 Row: 2 Column: 5
Value : 23 Row: 3 Column: 6
Value : 21 Row: 4 Column: 0
Value : 10 Row: 4 Column: 5
Value : 2 Row: 5 Column: 0
Value : 5 Row: 5 Column: 8
Value : 30 Row: 6 Column: 4
Value : 1 Row: 6 Column: 10
Value : 1 Row: 7 Column: 4
Value : 5 Row: 7 Column: 5
Value : 6 Row: 7 Column: 9
Value : 6 Row: 8 Column: 0
Value : 1 Row: 9 Column: 0
Value : 8 Row: 9 Column: 5
```