Bilkent University

Department of Computer Engineer

CS426 Parallel Computing

Project 2 Report

Serhat Aras

21401636

1. Kreduce

In this project, I am implementing kreduce function which is similar to collective communication function like MPI_Bcastor MPI_Reduce. First of all, each process is called this function with their locally sorted values. This values are similarity values of the process' documents. This similarities are sorted using quick-sort where the index changes are stored over another array while swapping the integers among themselves while sorting. Furthermore, since every project is calling the kreduce, I divided the functionality of the kreduce in to two. If the process Id (world_rank) is belongs to the master, then the kreduce function is collecting all the id's and their respective values with MPİ_Recv while other processes named slave processes are passing their ids and corresponding similarity values to master. Since all of this values are combined on the master process, the id's for least similar documents must be reordered. To do that I reuse my quick-sort implementation in order to get the overall least similar values with the given query

2. Program

Overall, the flow of the execution as follows master process reads the input sequentially and starts calculate the respective indexes for the arrays paralelly. All processes are calculate their similarity values and pass them to the kreduce. Master's kreduce combines all the given values and computes the leastk values.

On my computer I believe there is some os related issues because no matter what I did, I again face the same issues as project 1. All of my values are passed to Kreduce correctly however I cannot get the least values.

neo@vulcan:~/Desktop/Project 2$ mpicc -o main main.c utils.h utils.c -lm
neo@vulcan:~/Desktop/Project 2$ mpirun -n 4 ./main 5 4 documents.txt query.txt
Sequential Part: 0.127 ms
Parallel Part: 1.042 ms
Total Time: 1.169 ms

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Hardware Info of the system:

Computer (MSI GT62 7RE)
Processor   Intel(R) Core(TM) i7-7700HQ CPU @ 2.80GHz
Memory   16381MB
Graphic Card   NVidia Gtx1070 (8 GB)

Operating System	Ubuntu 18.10
Kernel Version	4.18.0-16-generic
Dev. Env	Visiual Studio Code
GCC Comp.	Using built-in specs.