

CPSC 479-01: Introduction to High Performance Computing

Dr. Bein

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Project 2

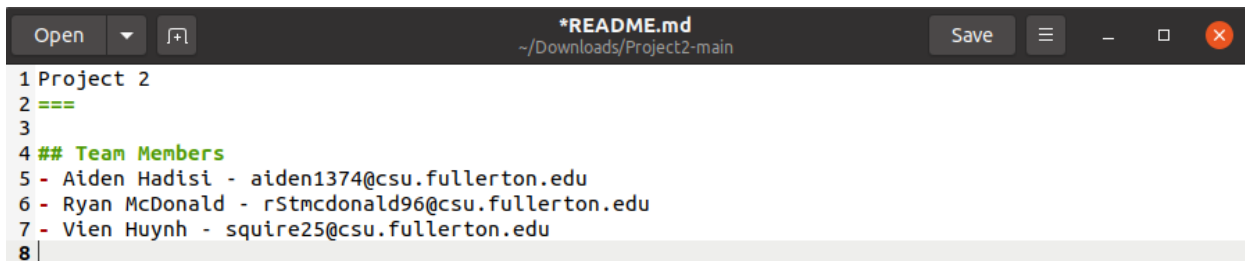
Group Members:

Aiden Hadisi - aiden1374@csu.fullerton.edu

Ryan McDonald - rstmcdonald96@csu.fullerton.edu

Vien Huynh - squire25@csu.fullerton.edu

Screenshot of group members

A screenshot of a text editor window titled '*README.md' with a file path of '~/.Downloads/Project2-main'. The editor shows a list of group members. Line 1 is 'Project 2', line 2 is '===', line 3 is empty, line 4 is '## Team Members', line 5 is '- Aiden Hadisi - aiden1374@csu.fullerton.edu', line 6 is '- Ryan McDonald - rstmcdonald96@csu.fullerton.edu', line 7 is '- Vien Huynh - squire25@csu.fullerton.edu', and line 8 is empty. The editor has a dark theme and standard window controls.

Pseudocode of algorithm

Generate number of openMP threads based on size of array.

Initialize array of set size with random values

//Parallel Implementation

Begin timer

Using openMP tasks to sort divided arrays among threads to work in parallel:

- Pick the last element of the array as pivot

- Put elements in correct position using `std::swap`

- Split array based on pivot

- Repeat until all elements of array are sorted

End timer

Output time of parallel execution

//Non parallel implementation

Begin timer

Done sequentially without multiple threads:

- Pick last element of the array as pivot

- Put elements in correct position using `std::swap`

- Split array based on pivot

- Repeat until all elements are sorted.

End timer

Output time of non parallel execution

How to compile and run project

To compile and run our project you must first open a terminal and navigate to the folder in which all of the files are located.

Next enter the following command into the terminal window “g++ -o Project2 -fopenmp benchmark.cpp quicksort-driver.cpp sort.cpp sort.h”.

After the program has been compiled it can be ran using the command “./Project2”.

Screenshots of code execution

Execution of program with an array of 2000 values:

```
student@tuffix-vm:~/Downloads/Project2-main$ ./Project2
Array Initialized with 2000 random values.
Parallel Time: 1002297 nanoseconds
Seq Time: 7418084 nanoseconds
```

Execution of program with an array of 5000 values:

```
student@tuffix-vm:~/Downloads/Project2-main$ ./Project2
Array Initialized with 5000 random values.
Parallel Time: 1875078 nanoseconds
Seq Time: 27270327 nanoseconds
```