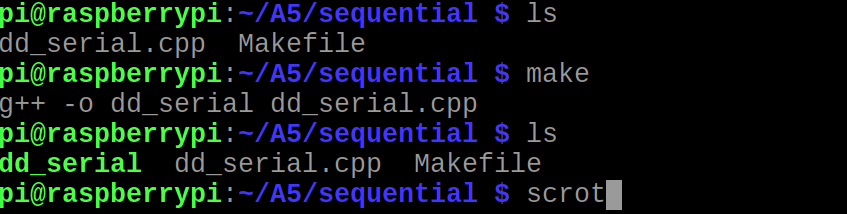
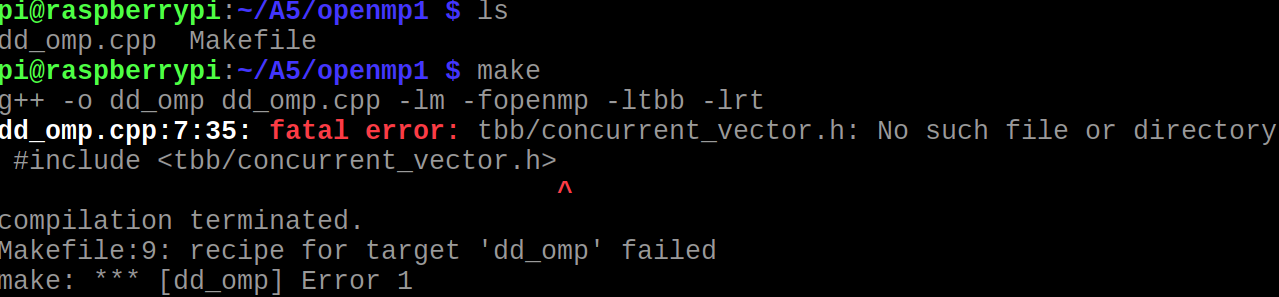
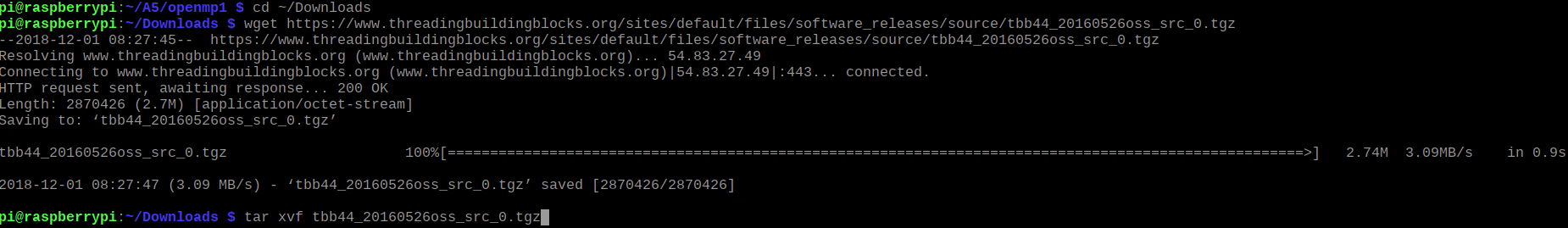
Parallel Programming Basics:

Make: dd\_serial

I was able to move the files and create the exacutable without issues.

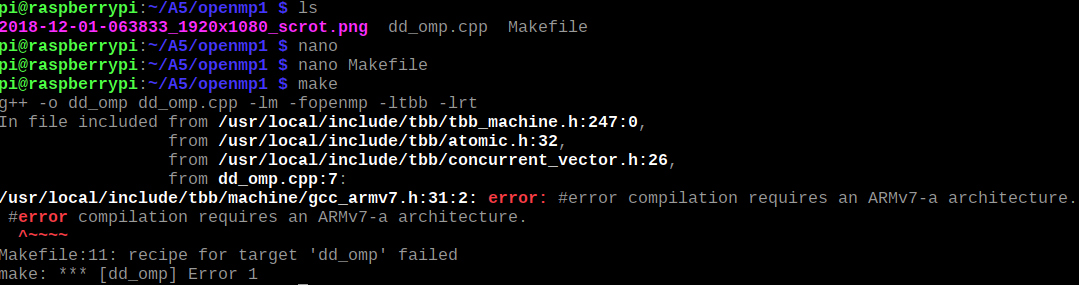
Make: dd\_omp

When trying to create the dd\_omp.exe, I ran into this error. The error was solved by installing the TBB Librabies.

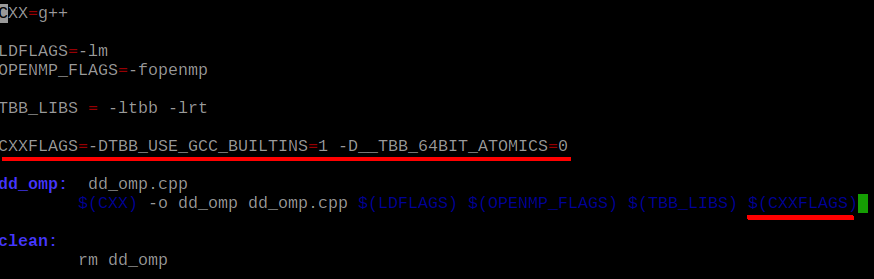
Get and unpack the libraries.

I followed the instruction on how to install from online. Mostly pasting provided commands into the terminal.

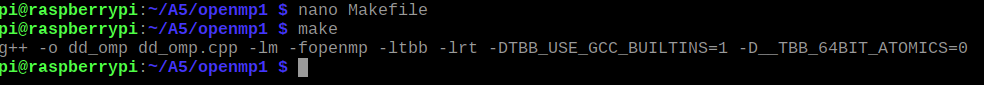
After installing TBB I ran into a new error.



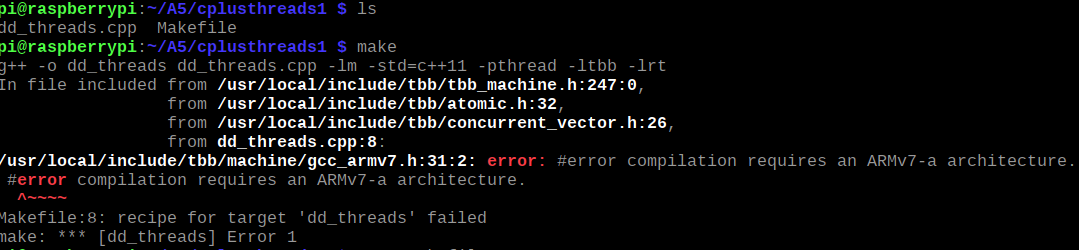
After resurching, I discovered I needed to add new flags to the Makefile.



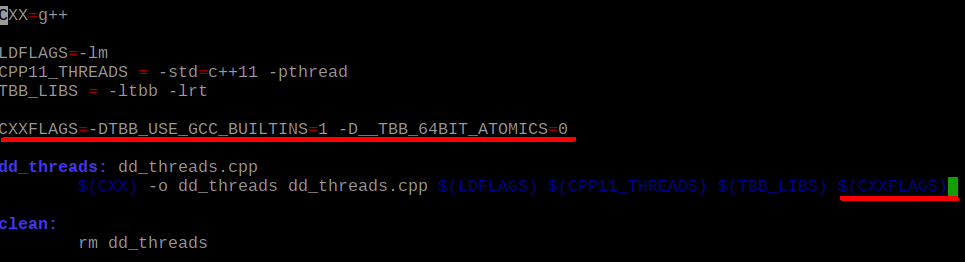
After adding these flags the code compiled.



I got the same error for the dd\_therads with the same fix.



Applying flags.



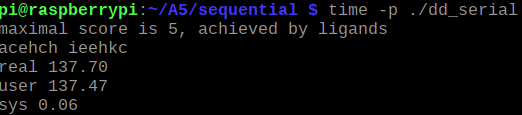
Fix after applying flags.

/Users/Angelica/Desktop/make-therads.png

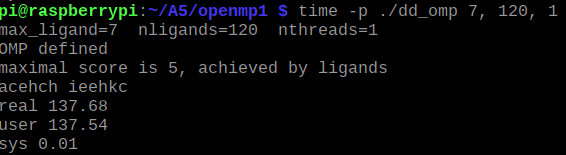
Time Runs:

|  |  |
| --- | --- |
| Implementation | Times |
| dd\_serial | 137.7 |
| dd\_omp 1 | 137.68 |
| dd\_threads 1 | 131.81 |

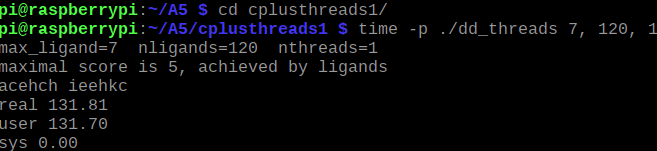
dd\_serial run-time.



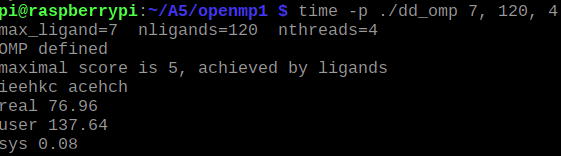
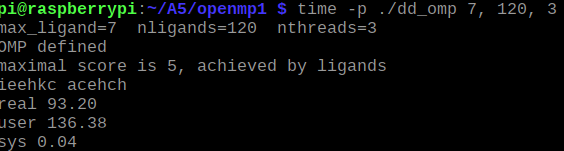
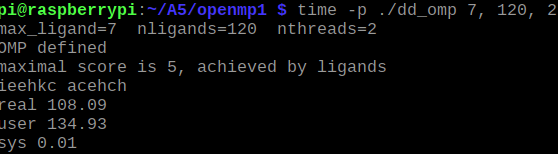
dd\_omp 1 run-time.



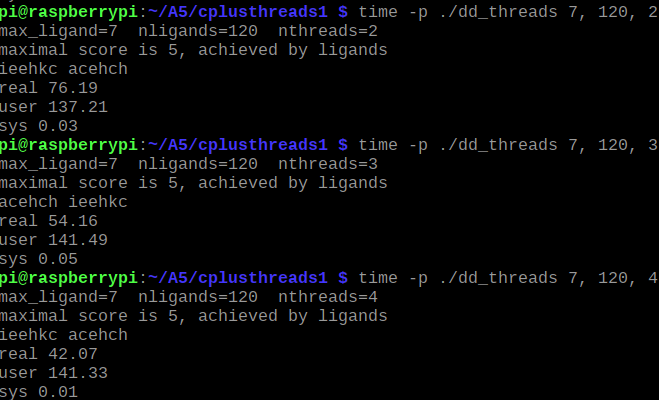
dd\_threads 1 run-time.



|  |  |  |  |
| --- | --- | --- | --- |
| Implementation | Time (s) 2 Threads | Time (s) 3 Threads | Time (s) 4 Threads |
| dd\_omp | 108.09 | 93.20 | 76.96 |
| dd\_threads | 76.19 | 54.16 | 42.07 |

DD-omp run-times with 2, 3, and 4 threads.

Each time I added threads the real time went down.

dd\_threads run-time with 2, 3, and 4 threads.

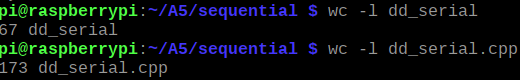
Disscution Questions:

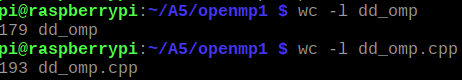
1. Which approach is the fastest?
   1. The C++11 Threads Solution was the fastest.
2. Determine the number of lines in each file (use wc -l). How does the C++11 implementation compare to the OpenMP implementations?
   1. dd\_serial: 67.exe, 173.cpp

dd\_omp: 179.exe, 193.cpp

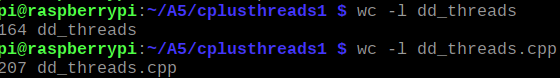
dd\_threads: 164.exe, 207.cpp

The C++11 implementation has a bit more user code, but the OpenMP implementation has more exacutable code

dd\_serial word count.

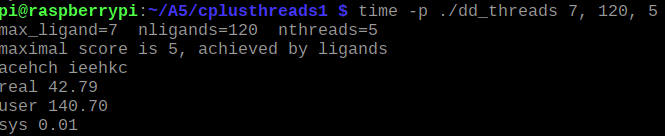
dd\_omp word count. 

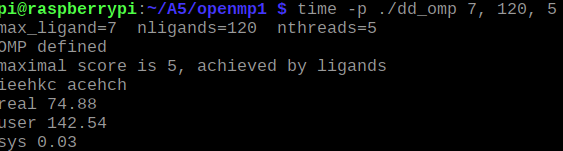
dd\_threads word count.



1. Increase the number of threads to 5 threads. What is the run time for each?
   1. dd\_threads: 42.79

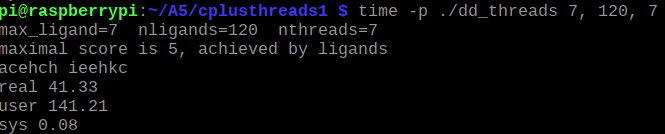
dd\_omp: 74.88

dd\_threads with 5 threads.

dd\_omp with 5 threads.

1. Increase the maximum ligand length to 7, and rerun each program. What is the run time for each?
   1. dd\_threads: 41.33

dd\_omp: 54.87

dd\_threads with 7 threads.

dd\_omp with 7 threads.