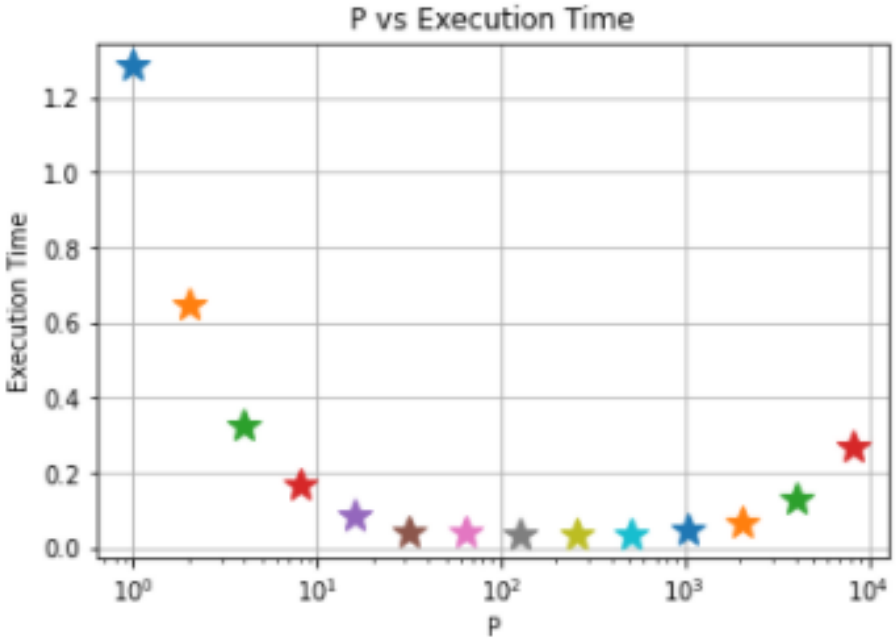
UIN: 631000852

Name: Nimoshika Jayaraman

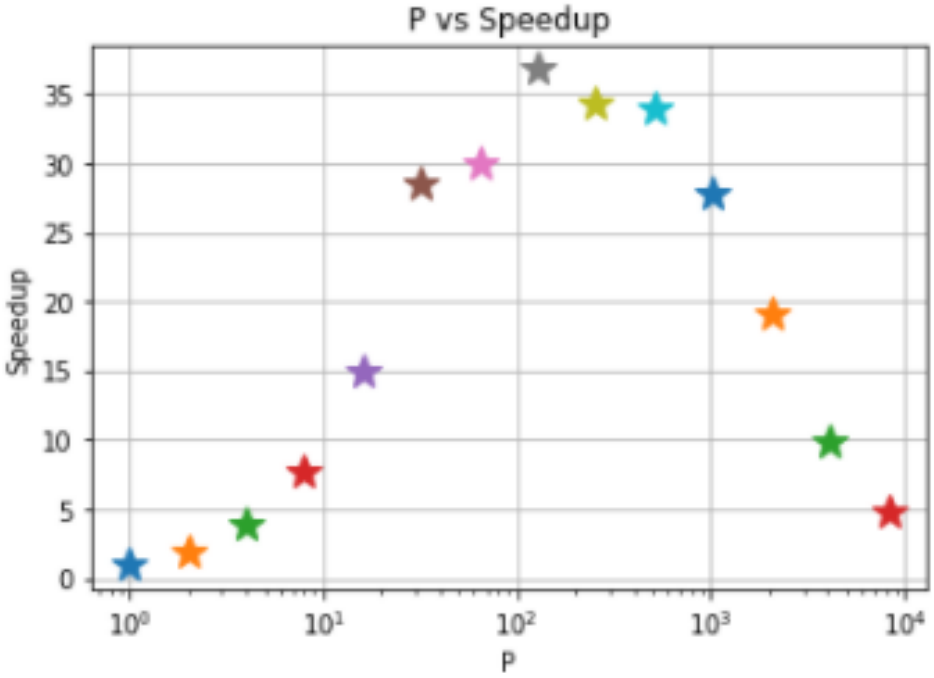
HW1: Parallel Programming on a Multicore Multiprocessor

Part1. Shared-Memory Programming with Threads

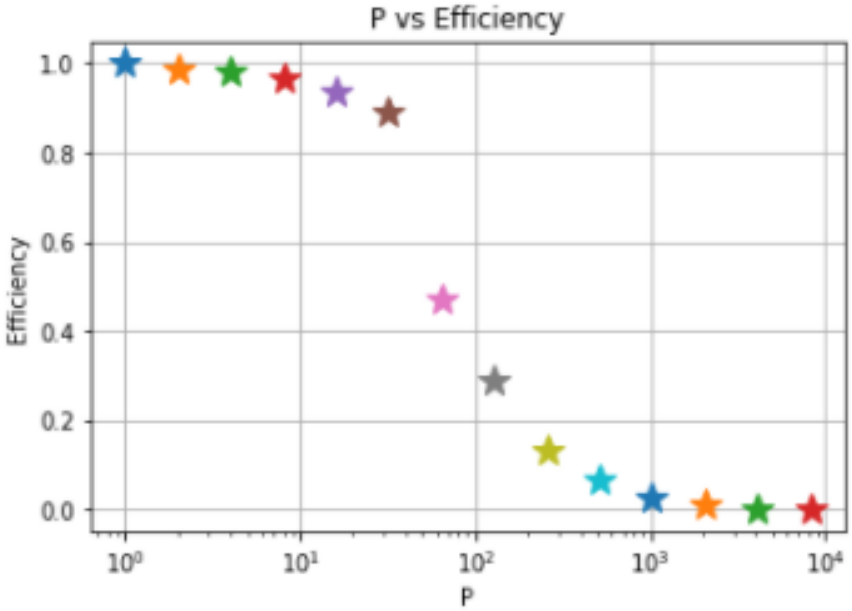
1.1



1.2.



1.3



1.4. In my experiments, the parallel runtime is minimum when p=128.

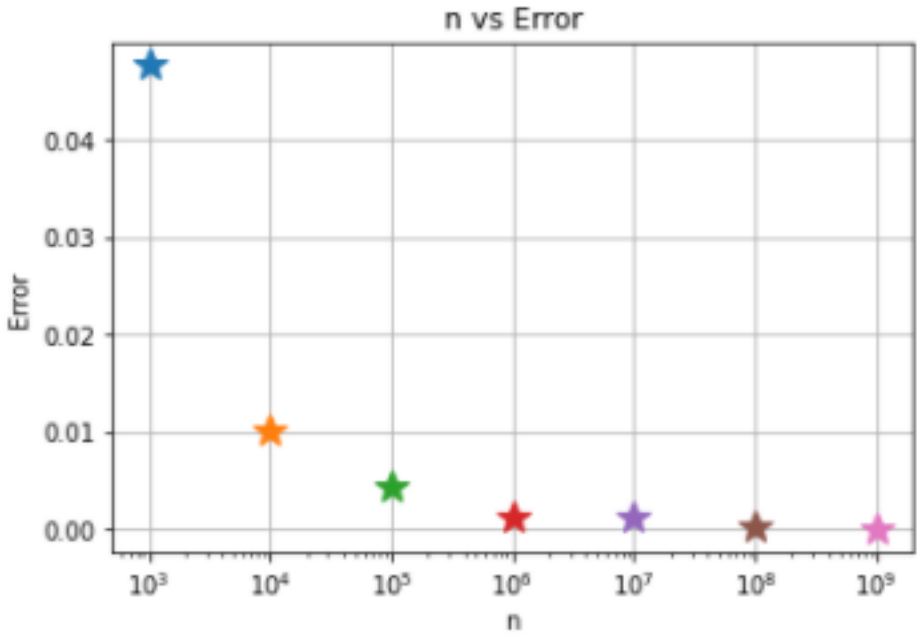
2.1. When n=10^10, the parallel runtime is minimum when p=1024.

2.2. Yes, Runtime increases as P is increased beyond certain value (1024 in experiment). when it goes beyond it, it would have only limited number of cores (48) to execute them. Too many threads so the available cores spend a lot of time scheduling threads in and out, so the time goes up. More threads also take more time communicating with each other during processing which increases the runtime.

3. yes, there would be difference in the number of threads needed to obtain minimum execution time. When the number of threads is more it needs more time to reach the minimum execution time (i.e the P value is more) while the number of threads is less it needs less P value to obtain minimum runtime comparatively.

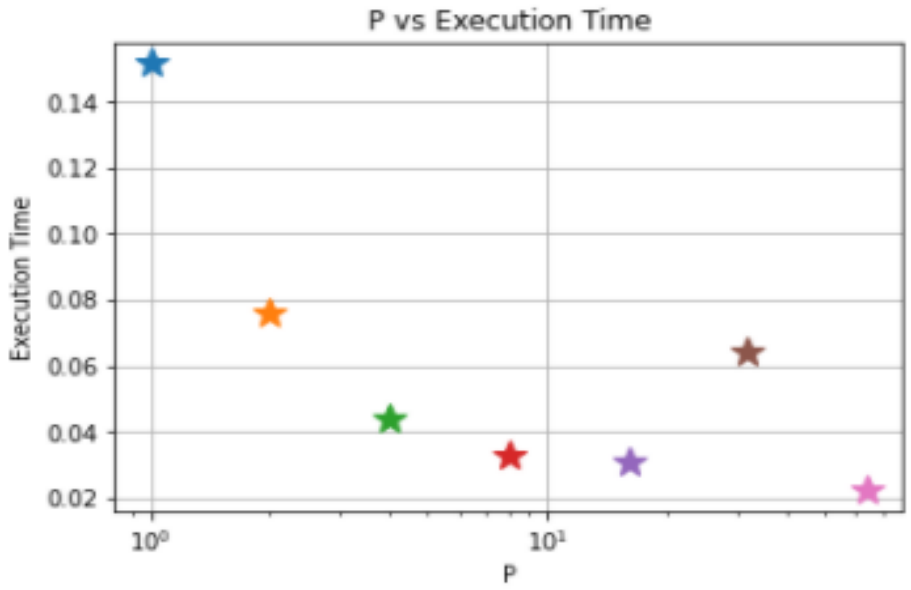
Yes, it is observed in experiments. For n=10^8, Minimum execution time was when p=128 while for n=10^10, minimum execution time was when p=1024.

4.

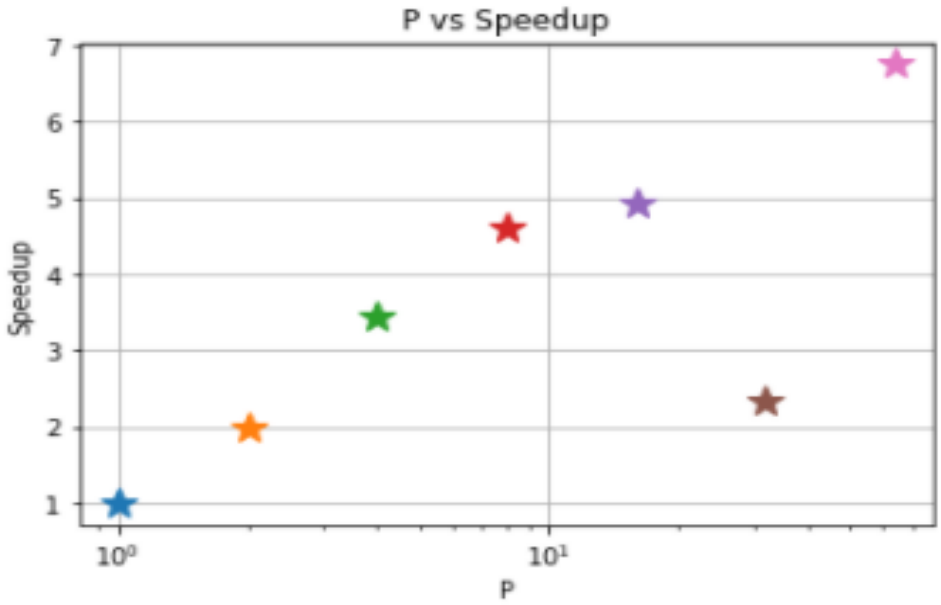


Part 2. Distributed-Memory Programming with MP1

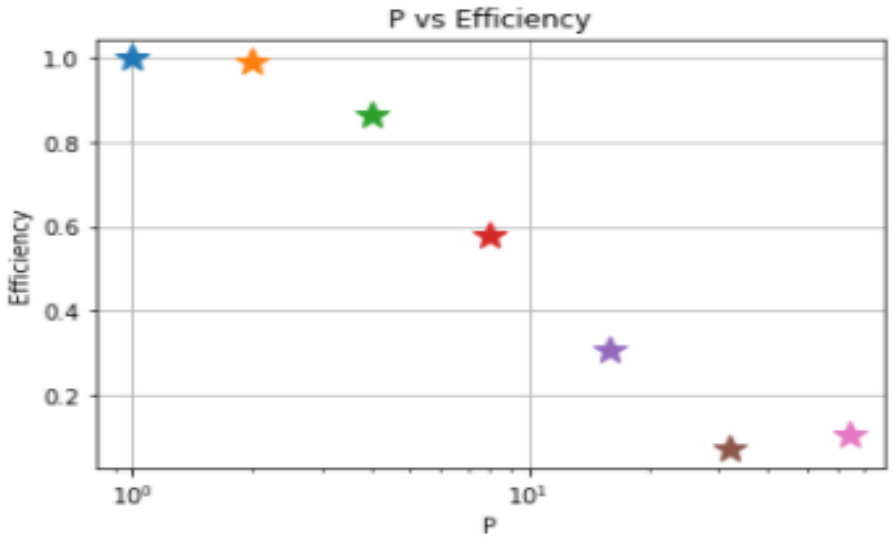
5.1.



5.2.

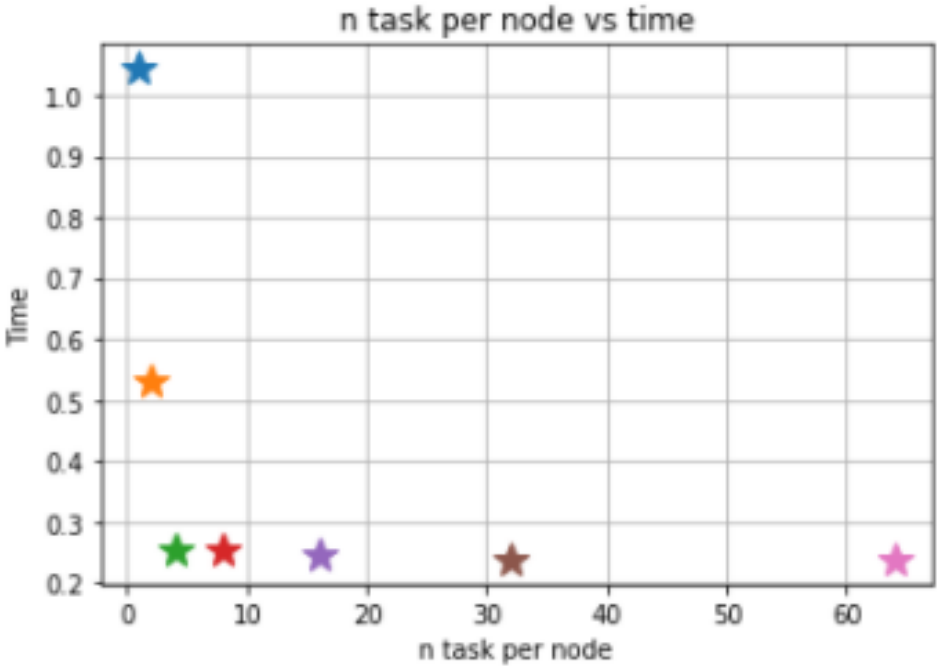


5.3.

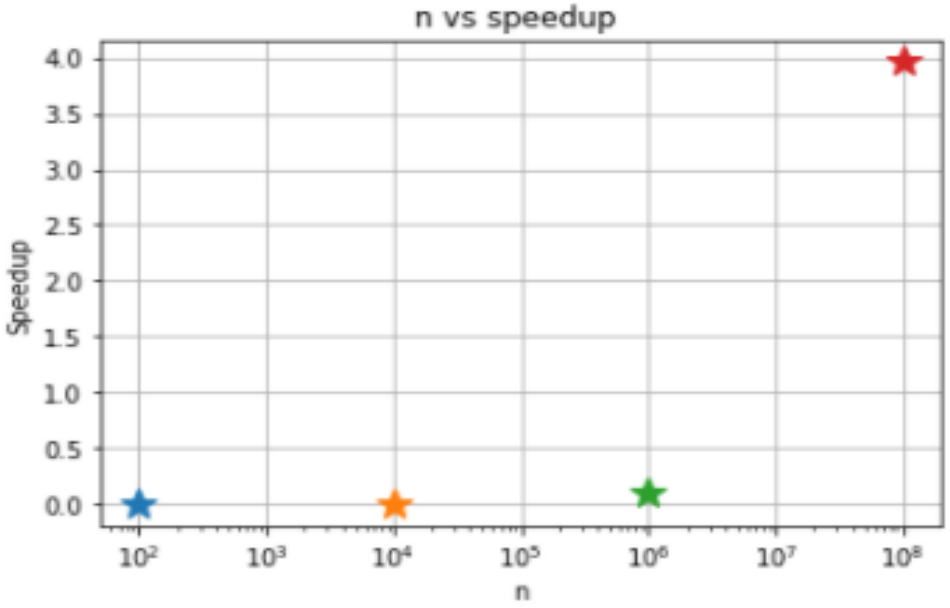


5.4. when p=64, the parallel runtime becomes minimum.

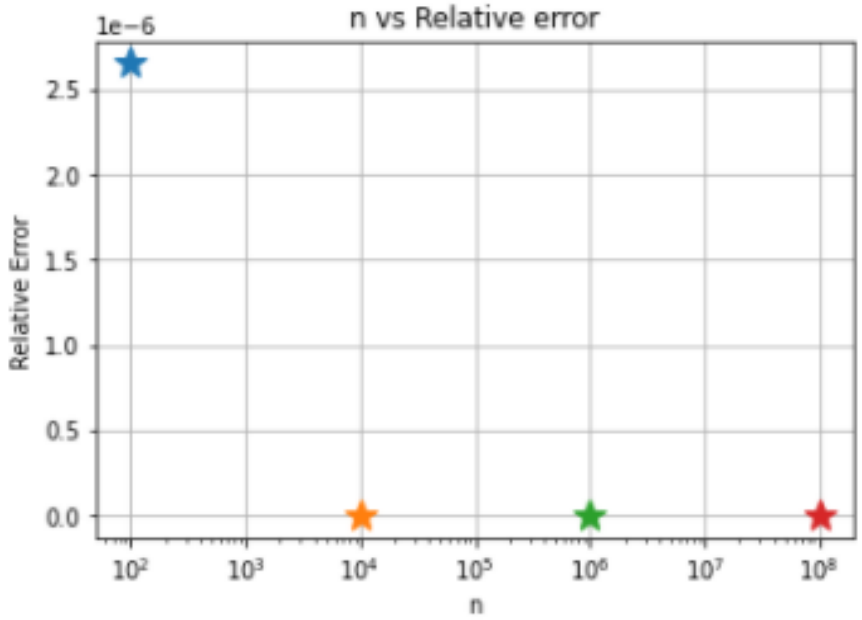
6. The value of ntask-per-node that minimizes the total_time is 32.



7.1.


n vs speedup
Speedup
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
10^2
10^3
10^4
10^5
10^6
10^7
10^8
n

7.2.


n vs Relative error
1e−6
Relative Error
2.5
2.0
1.5
1.0
0.5
0.0
10^2
10^3
10^4
10^5
10^6
10^7
10^8
n