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COMP8005 Assignment 1

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Design

The CPU task the prime decomposition function provided in lab was used for both threading and processing tests.
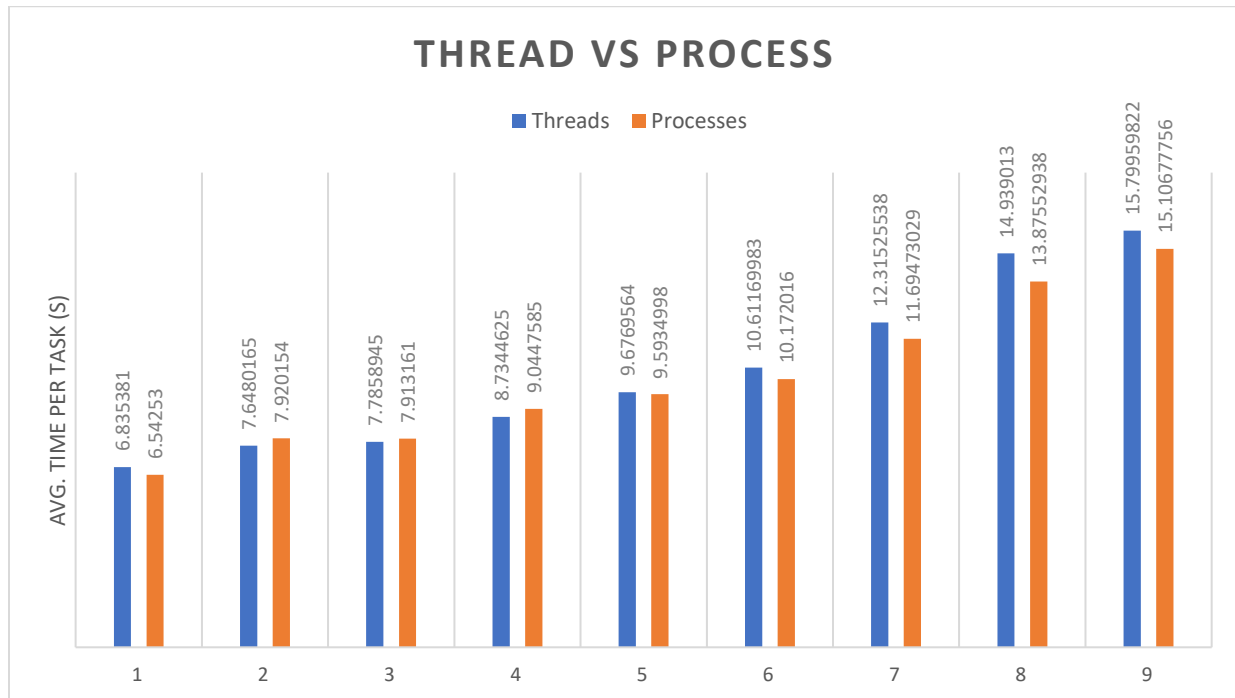
Psudo code

Multithreading

       Number to be decomposed entered -> **n**

       Start time of program is initialized

       All threads are initialized to run task with the number **n**

       All threads are started

              Start time of thread is initialized

              Task is completed

              Task gives output

              Time elapsed in thread is calculated and displayed

       Time elapsed in program is calculated and displayed

       Program exit

Multiprocessing

       Number of processes entered -> **p**

       Number to be decomposed entered -> **n**

       Start time of program is initialized

       For loop to start all processes

              If process is parent after fork break

       Do task

       Time elapsed in program is calculated and displayed

       Program exit

Report

THREAD VS PROCESS

■ Threads ■ Processes

Group	1	2	3	4	5	6	7	8	9
Threads	6.835381	7.6480165	7.7858945	8.7344625	9.6769564	10.61169983	12.31525538	14.939013	15.79959822
Processes	6.54253	7.920154	7.913161	9.0447585	9.5934998	10.172016	11.69473029	13.87552938	15.10677756

AVG. TIME PER TASK (S)

Observations

In this scenario the threads are faster until 5 threads are being used in which case the processes become comparingly faster.

Until 6 threads/processes the average time per task only increased by ~10% for every 6 threads/processes added. After 6 threads/processes (core count of the test CPU) the average time per task increased by ~18%

Adding threads and Processes will only give diminishing returns. With two threads I can finish 4 tasks in the same time it takes eight threads to finish 8 tasks. That might be half the output but only ¼ of the resources.

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Test/Data

I used the prime number 275604541 to test threads and processes. If the task printed 275604541 it was considered a pass. As all the tests were passing I removed the print statement to shave off a few milliseconds per execution to get better measurements.

Thread results

									avg time	increase in time
7.572586	7.723447								7.648017	
7.849611	7.907723	7.929413	7.655431	7.668755	7.704434				7.785895	102%
7.972217	7.977858	9.489164	9.498611						8.734463	112%
8.266532	9.802132	9.837715	10.20252	10.27588					9.676956	111%
10.40618	10.46398	10.47517	10.6844	10.79708	10.8434				10.6117	110%
11.96335	12.08044	12.22843	12.32144	12.505	12.50547	12.57829	12.33963		12.31526	116%
14.36525	14.71769	14.73191	14.98983	15.02981	15.16965	15.21431	15.29366		14.93901	121%
15.40188	15.39869	15.54096	15.72786	15.84807	15.93779	15.96948	16.04493	16.32673	15.7996	106%

Process results

									avg time	increase in time
7.69253	8.147778								7.920154	
7.873421	7.930536	7.935526							7.913161	100%
8.034604	8.099726	10.01841	10.02629						9.044759	114%
8.312295	9.574999	9.718467	10.14286	10.21888					9.5935	106%
10.05908	10.06951	10.08151	10.10342	10.10952	10.60908				10.17202	106%
10.80004	10.95429	11.71284	11.96106	11.99569	12.0177	12.4215			11.69473	115%
13.3684	13.57331	13.69827	13.97194	13.98013	13.96823	13.99288	14.45108		13.87553	119%
14.43323	14.73889	15.08694	15.1057	15.14817	15.24789	15.3194	15.40719	15.47359	15.10678	109%

Machine

CPU

    AMD FX-6100 Six-Core Processor

    Core Speed   3913.1 MHz

    TDP Limit   95.0 Watts

Process experiment

peymantp@peymantp-desktop:~/Documents/BTech/8005/Assignment1$ ./processes 1 275604541
275604541
spent: 6.542530 secs

peymantp@peymantp-desktop:~/Documents/BTech/8005/Assignment1$ ./processes 2 275604541
275604541
spent: 7.692530 secs
275604541
spent: 8.147778 secs

peymantp@peymantp-desktop:~/Documents/BTech/8005/Assignment1$ ./processes 3 275604541
275604541
spent: 7.873421 secs
275604541
spent: 7.930536 secs
275604541
spent: 7.935526 secs

peymantp@peymantp-desktop:~/Documents/BTech/8005/Assignment1$ ./processes 4 275604541
275604541
spent: 8.034604 secs
275604541
spent: 8.099726 secs
275604541
spent: 10.018410 secs
275604541
spent: 10.026294 secs

peymantp@peymantp-desktop:~/Documents/BTech/8005/Assignment1$ ./processes 5 275604541
275604541
spent: 8.312295 secs
275604541
spent: 9.574999 secs
275604541
spent: 9.718467 secs
275604541
spent: 10.142860 secs
275604541
spent: 10.218878 secs

peymantp@peymantp-desktop:~/Documents/BTech/8005/Assignment1$./processes 6 275604541
275604541
spent: 10.059076 secs
275604541
spent: 10.069505 secs
275604541
spent: 10.081507 secs
275604541
spent: 10.103417 secs
275604541
spent: 10.109515 secs
275604541
spent: 10.609076 secs

peymantp@peymantp-desktop:~/Documents/BTech/8005/Assignment1$./processes 7 275604541
275604541
spent: 10.800041 secs

275604541
spent: 10.954286 secs
275604541
spent: 11.712835 secs
275604541
spent: 11.961057 secs
275604541
spent: 11.995694 secs
275604541
spent: 12.017695 secs
275604541
spent: 12.421504 secs
----
peymantp@peymantp-desktop:~/Documents/BTech/8005/Assignment1$ ./processes2 8 275604541
spent: 13.368399 secs
spent: 13.573313 secs
spent: 13.698270 secs
spent: 13.971937 secs
spent: 13.980130 secs
spent: 13.968228 secs
spent: 13.992875 secs
spent: 14.451083 secs

peymantp@peymantp-desktop:~/Documents/BTech/8005/Assignment1$ ./processes2 9 275604541
spent: 14.433229 secs
spent: 14.738891 secs
spent: 15.086941 secs
spent: 15.105699 secs
spent: 15.148170 secs
spent: 15.247893 secs
spent: 15.319402 secs
spent: 15.407186 secs
spent: 15.473587 secs

Threading Experiment

peymantp@peymantp-desktop:~/Documents/Assignment_1$ ./multithread6 141650939
141650939
spent: 5.320150 secs
141650939
spent: 5.330402 secs
141650939
spent: 5.345049 secs
141650939
spent: 5.363283 secs
141650939
spent: 5.409448 secs
141650939

spent: 5.432961 secs
Total spent: 5.433364 secs

peymantp@peymantp-desktop:~/Documents/Assignment_1$ ./multithread6 275604541
275604541
spent: 10.406180 secs
275604541
spent: 10.463977 secs
275604541
spent: 10.475171 secs
275604541
spent: 10.684398 secs
275604541
spent: 10.797078 secs
275604541
spent: 10.843395 secs
Total spent: 10.843929 secs

peymantp@peymantp-desktop:~/Documents/Assignment_1$ ./multithread5 275604541
275604541
spent: 8.266532 secs
275604541
spent: 9.802132 secs
275604541
spent: 9.837715 secs
275604541
spent: 10.202521 secs
275604541
spent: 10.275882 secs

Total spent: 10.276114 secs
peymantp@peymantp-desktop:~/Documents/Assignment_1$ ./multithread4 275604541
275604541
spent: 7.972217 secs
275604541
spent: 7.977858 secs
275604541
spent: 9.489164 secs
275604541
spent: 9.498611 secs

Total spent: 9.498906 secs
peymantp@peymantp-desktop:~/Documents/Assignment_1$ ./multithread3 275604541
275604541
spent: 7.849611 secs
275604541
spent: 7.907723 secs
275604541

spent: 7.929413 secs
peymantp@peymantp-desktop:~/Documents/Assignment_1$ ./multithread3 275604541
275604541
spent: 7.655431 secs
275604541
spent: 7.668755 secs
275604541
spent: 7.704434 secs

Total spent: 7.704795 secs
peymantp@peymantp-desktop:~/Documents/Assignment_1$ ./multithread2 275604541
275604541
spent: 7.572586 secs
275604541
spent: 7.723447 secs

Total spent: 7.723573 secs
peymantp@peymantp-desktop:~/Documents/Assignment_1$ ./multithread1 275604541
275604541
spent: 6.835381 secs

Total spent: 6.835590 secs
peymantp@peymantp-desktop:~/Documents/Assignment_1$ ./singlethread 275604541 6
275604541
spent: 7.678676 secs
275604541
spent: 6.610758 secs
275604541
spent: 6.631928 secs
275604541
spent: 6.611547 secs
275604541
spent: 6.698522 secs
275604541
spent: 6.998028 secs

Total spent: 41.229606 secs
----
peymantp@peymantp-desktop:~/Documents/BTech/8005/Assignment1$ ./threads 275604541
spent: 11.963353 secs
spent: 12.080435 secs
spent: 12.228433 secs
spent: 12.321437 secs
spent: 12.505000 secs
spent: 12.505471 secs
spent: 12.578289 secs

Total spent: 12.586694 secs

peymantp@peymantp-desktop:~/Documents/BTech/8005/Assignment1$ ./threads 275604541
spent: 11.100489 secs
spent: 12.074148 secs
spent: 12.368896 secs
spent: 12.434865 secs
spent: 12.512965 secs
spent: 12.772515 secs
spent: 13.113497 secs
Total spent: 13.117382 secs

peymantp@peymantp-desktop:~/Documents/BTech/8005/Assignment1$ ./threads 275604541
spent: 14.365248 secs
spent: 14.717688 secs
spent: 14.731913 secs
spent: 14.989829 secs
spent: 15.029814 secs
spent: 15.169645 secs
spent: 15.214308 secs
spent: 15.293659 secs
Total spent: 15.307391 secs

peymantp@peymantp-desktop:~/Documents/BTech/8005/Assignment1$ ./threads 275604541
spent: 15.401875 secs
spent: 15.398693 secs
spent: 15.540959 secs
spent: 15.727862 secs
spent: 15.848067 secs
spent: 15.937787 secs
spent: 15.969479 secs
spent: 16.044928 secs
spent: 16.326734 secs
Total spent: 16.328229 secs